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Refrigeration Monitor and Case Control Installation and Operation Manual

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THIS PRODUCT IS AN FCC CLASS A DIGITAL DEVICE.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and—if not installed and used in accordance with this instruction manual—may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case correction of the interference will be at the user's expense.

827-1005, RMCC CE VERSION, CONFORMS TO CE STANDARD BSEN 50082-1 AND BSEN 50081-1.

CE

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Rev 4	Changed Maximum Number of 8IO Boards from Ten to Nine	5-11
Rev 3	New CCB part number added for use with Sporlan SEI valves.	7-1
Rev 3	Valve type jumper settings for CCBs are now "12V" and "24V".	7-2
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1 RMCC Introduction

The Refrigeration Monitor and Case Control (RMCC) (PN 827-1000) is a microprocessor-based controller designed to provide complete control of all refrigeration systems. The RMCC is the controlling component of a three network configuration (I/O, Host, Remote Communication) that includes case controllers, input and output communication boards, remote communication software, and a variety of sensors, probes, and transducers.

2 Hardware Overview

Computer Process Controls uses both an RS485 host network, I/O network, and an RS232 remote communication network to monitor and manage all aspects of refrigeration control.

Within the framework of each of these networks various components are required to monitor system performance; control system operation; and interact with remote communication packages. In general, a standard refrigeration control network will consist of the following components:

1. RMCC
2. Various input and output communication boards
3. 485 Alarm Panel
4. RS232 Bus Amplifier
5. Remote communication modem
6. Network wiring
7. Sensors and loads

The following sections provide an overview of the function of each of these components. A more detailed examination of the installation and configuration of these components for actual in-store operation is provided in **Section 3,** *Hardware Mounting.*

2.1. REFLECS Controllers

The "brain" of any CPC network is the REFLECS controller. REFLECS is an acronym for (REF)rigeration, (L)ighting, and (E)nvironmental (C)ontrol (S)ystem. The following list categorizes the current REFLECS line of controllers:

Refrigeration Control

- Refrigeration Monitor and Control (RMC)
- Refrigeration Monitor and Case Control (RMCC)

Environmental Control

- Refrigeration Monitor and Case Control (RMCC)
- Building Control Unit (BCU)
- Building Environmental Control (BEC)
- Store Environmental Control (SEC)

Data Logging

- Intelligent Data Logger (IDL)

CPC REFLECS controllers are designed to perform three specific tasks: system control, system monitoring, and data storage. Each controller—depending on its software package—is tailored to perform one or all of these three tasks.

2.1.1. Refrigeration Monitor and Case Control (RMCC)

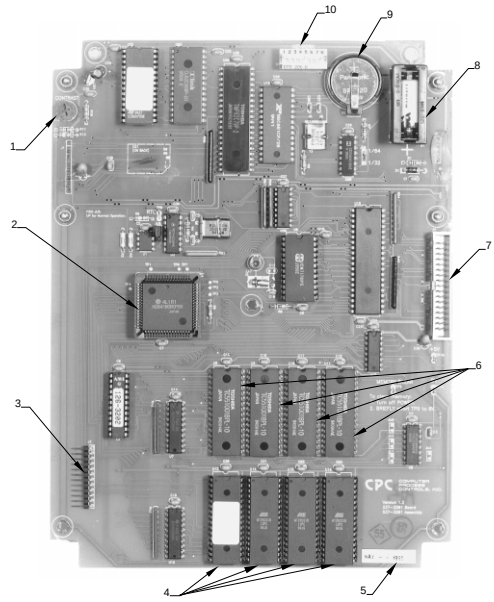
The Refrigeration Monitor and Case Control primarily interacts with refrigeration system components including compressors, condensers, and refrigerated cases. In addition, the RMCC provides extensive sensor control and logging and graphing features that allow the user to view accurate real-time information about system conditions.

The RMCC may be configured to control a refrigeration system using traditional pressure control of up to four suction groups and as many as 22 compressors, or it may be used to interact with CPC's case controller for complete control of refrigerated case valves, superheat, fans, lights, defrost, and anti-sweat heaters.

All other refrigeration system components must be connected to the RMCC for proper monitoring and control of the system. The RMCC has connections for I/O, host, and remote communication components. Compressors, condensers, refrigerated cases, and sensors and transducers, while not directly connected to the RMCC, are accessed by the controller through the communication boards described below.

Installation of the RMCC consists of mounting the unit in an easily accessible location. All communication boards, additional RMCCs, alarms panels, and remote communication equipment must be wired to the RMCC. Network switches must be set to give the RMCC a relative address on the I/O network. A 120/208 volt power supply is required to provide power to the unit. Finally, the RMCC must be configured based on the refrigeration components to be controlled.

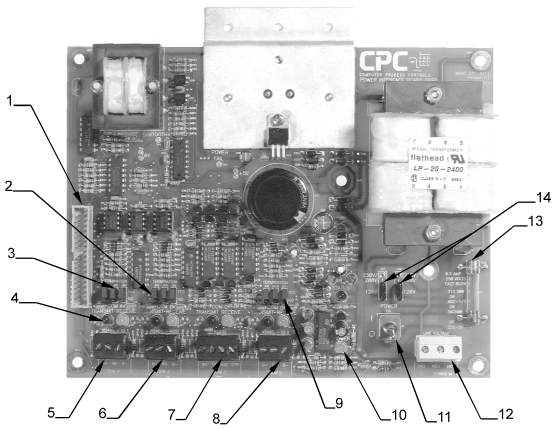
The RMCC consists of a rugged steel enclosure containing a processor board and Power Interface Board (PIB). The Processor Board ***(Figure 2-1)*** contains the LCD screen, the main processor, and the memory chips that hold all the code required to operate the RMCC and the data entered at the front panel or through UltraSite. The Processor Board is mounted on the door of the enclosure and is connected to the PIB with a ribbon cable. The PIB ***(Figure 2-2)*** contains all power and network connections required to power the RMCC and drive the network, and is attached to the rear wall of the enclosure.



LEGEND			
1	LCD Screen Contrast Dial	7	Ribbon Cable Connection to Power Interface Board
2	Main Processor Chip		
3	Ribbon Cable Connection to Keypad	8	RAM Battery
4	Flash Memory Chips	9	Clock Battery
5	Manufacture Date	10	Network Baud Rate Dip Switch
6	RAM Chips		

26502005

Figure 2-1 *- REFLECS Processor Board*



LEGEND			
1	Ribbon Cable Connection to Processor Board	7	Remote Communication Network Connection (COM C)
2	COM B Termination Resistance Jumpers	8	I/O Network Connection (COM D)
		9	COM D Term. Resistance Jumpers
3	COM A Termination Resistance Jumpers	10	LED Power Indicator
		11	Power Switch
4	Network Status Lights (4 places)	12	AC Power Input Connection
5	I/O Network Connection (COM A)	13	AC Input Power Fuse
6	Host Network Connection (COM B)	14	AC Voltage Jumpers

26502016

Figure 2-2 *- Power Interface Board*

2.2. Input Communication Boards

To properly interact with any environmental control system, the REFLECS requires constant, accurate system information. CPC provides this information to the REFLECS through a series of input communication boards. Except for boards designed to supply both input and output functions, the 16AI Communication Board is the only input board used by CPC.

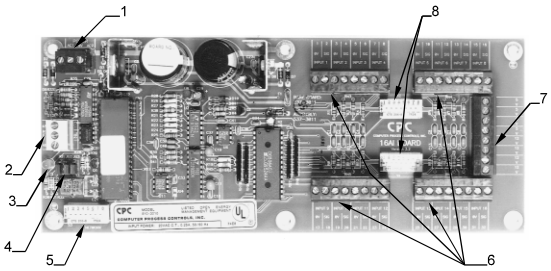
2.2.1. 16AI Board

The 16AI Analog Input Board is a general purpose input board capable of receiving an input signal through any of 16 two-wire input connections. To function, the 16AI must be connected through the RS485 I/O network to the REFLECS. When properly installed, the board receives either digital or analog data from sensors wired to any of the 16 input connections located on the board. Input definition screens within the REFLECS allow the user to define each input for refrigeration control.

A maximum of sixteen 16AIs may be connected to an RMCC through the RS485 COM A and D networks.

Within a refrigeration system, the 16AI may be connected to temperature, humidity, or dew point sensors and pressure transducers, liquid level indicators, and refrigerant leak transducers.

The 16AI Board is designed with several features that make it easy to install, wire, and configure. These main user interface features are shown in ***Figure 2-3***.



LEGEND			
1	AC Input Power Connection	5	Address and Baud Rate Dip Switch
2	I/O Network Connection	6	Input Connections
3	LED Power Indicator	7	Output Power Connection
4	Termination Resistance Jumpers	8	Input Dip Switches

26501001

Figure 2-3 *- 16AI Analog Input Board*

2.3. Output Communication Boards

When a REFLECS receives data from the 16AI board, it interprets that information based on current stored set points. System changes required as a result of this examination are then made through one of several output communication boards. CPC offers four different output boards for refrigeration system control: 1) 8RO, Relay Output Board, 2) 8RO FC, Form C Relay Output Board, 3) 4AO, Analog Output Board and 4) 8DO, Digital Output Board.

2.3.1. 8RO Board

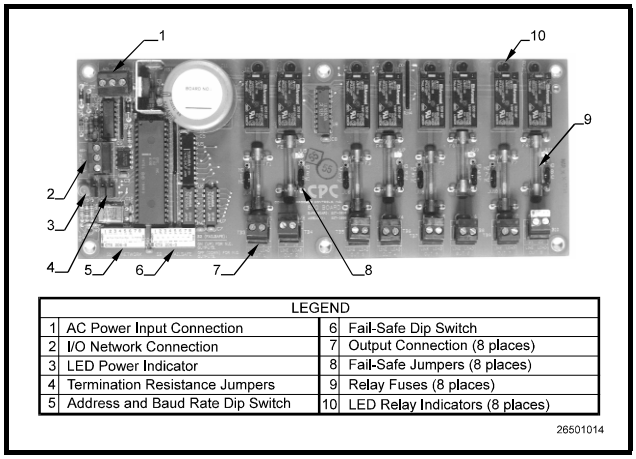
The 8RO Relay Board is a general-purpose board capable of supplying an output signal through any of eight standard contact relays.

A maximum of sixteen 8ROs and 8RO-FCs may be connected to an RMCC through the RS485 COM A and D networks.

To function, the 8RO board must be connected through the RS485 I/O network to the REFLECS. When properly installed, the 8RO receives an electrical impulse from the REFLECS, which either opens or closes any of eight contact relays. Output definitions within the REFLECS software allow the user to configure the 8RO board to interact with any refrigeration system component.

The 8RO board is the direct link between the REFLECS and refrigeration system component operation. Information gathered by the controller from the 16AI board or 8IO board is checked against current stored set points. If differences in the received input data and the set point information are detected, a signal is either sent to the proper 8RO relay, or an existing signal is discontinued. Through the use of this relay signal, refrigeration control functions that can be properly maintained by a simple contact closure sequence are effectively operated by the REFLECS.

Like the 16AI input board, the 8RO board is easily installed and operated within the CPC network environment because of its straightforward design. Several of these features are shown in ***Figure 2-4***.



LEGEND			
1	AC Power Input Connection	6	Fail-Safe Dip Switch
2	I/O Network Connection	7	Output Connection (8 places)
3	LED Power Indicator	8	Fail-Safe Jumpers (8 places)
4	Termination Resistance Jumpers	9	Relay Fuses (8 places)
5	Address and Baud Rate Dip Switch	10	LED Relay Indicators (8 places)

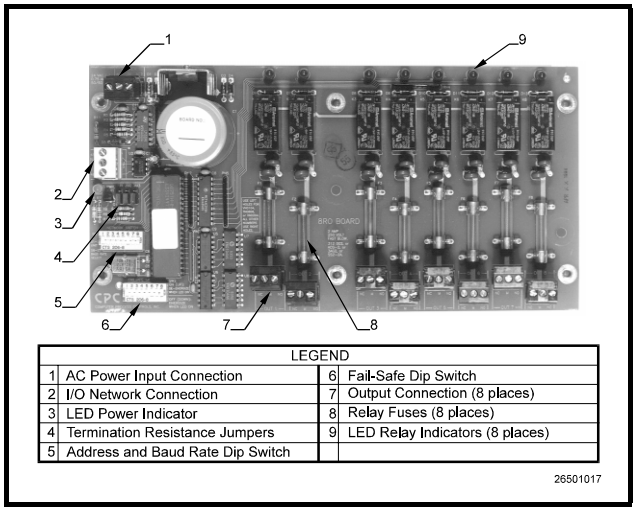
26501014

Figure 2-4 *- 8RO Relay Output Board*

2.3.2. 8RO Form C Board

A maximum of sixteen 8ROs and 8RO-FCs may be connected to an RMCC through the RS485 COM A and D networks.

The 8RO Relay Output Board with Form C contacts ***(Figure 2-5)*** is identical in function to the standard 8RO Relay Output Board, except that it uses relays with form C contacts and does not use fail-safe jumpers (wiring the contacts as either normally open or normally closed creates the fail-safe condition). The 8RO-FC is slightly larger than the standard 8RO; therefore, specific mounting instructions for the 8RO-FC provided in **Section 3.2.,** *I/O Boards and Enclosures*, should be used.



LEGEND			
1	AC Power Input Connection	6	Fail-Safe Dip Switch
2	I/O Network Connection	7	Output Connection (8 places)
3	LED Power Indicator	8	Relay Fuses (8 places)
4	Termination Resistance Jumpers	9	LED Relay Indicators (8 places)
5	Address and Baud Rate Dip Switch		

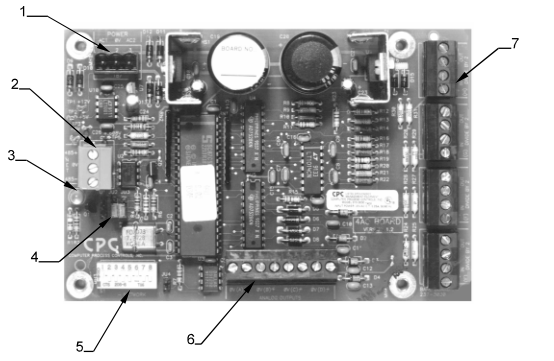
26501017

Figure 2-5 *- 8RO-FC Relay Output Board with Form C Contacts*

2.3.3. 4AO Analog Output Board

Three 4AOs may be connected to an RMCC through the RS485 COM A and D networks.

The 4AO Analog Output Board ***(Figure 2-6)***, is configured with four analog output connections that provide a variable voltage signal to any of four variable speed devices that may be controlled by a single REFLECS.



LEGEND			
1	AC Power Input Connection	5	Address and Baud Rate Dip Switch
2	I/O Network Connection	6	Analog Outputs (4 places)
3	LED Power Indicator	7	Divider Circuits (4 places)
4	Terminating Resistance Jumpers		

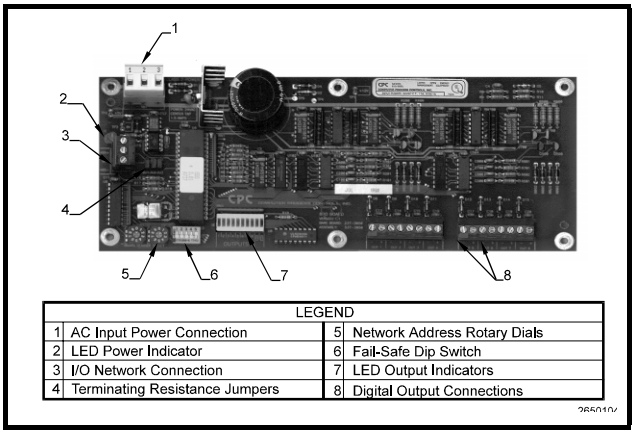
26501007

Figure 2-6 *- 4AO Analog Output Board*

2.3.4. 8DO Digital Output Board

Up to two 8DOs may be connected to an RMCC through the RS485 COM A and D networks.

The 8DO digital output board ***(Figure 2-7)*** is similar to the 8RO board, except that instead of a relay that closes on and off, each output generates either a high (12VDC) or low (0VDC) signal. The 8DO has eight outputs which may pulse up to 150mA at 12VDC. The 8DO's primary functions are to control anti-sweat heaters.



LEGEND			
1	AC Input Power Connection	5	Network Address Rotary Dials
2	LED Power Indicator	6	Fail-Safe Dip Switch
3	I/O Network Connection	7	LED Output Indicators
4	Terminating Resistance Jumpers	8	Digital Output Connections

Figure 2-7 *- 8DO Digital Output Board*

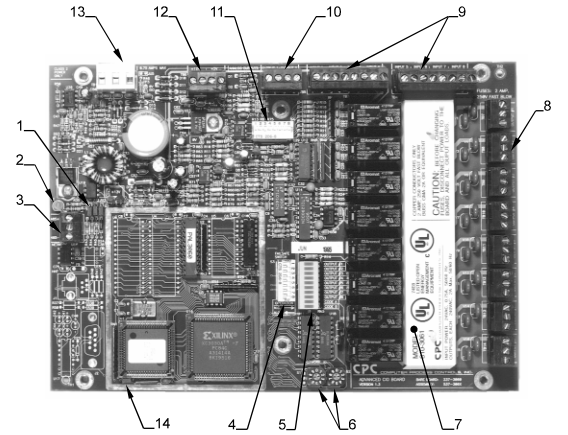
2.4. Special Purpose Communication Boards

Special purpose communication boards are boards that either possess greater capabilities than standard input and output boards, or combine the features of both input and output boards into a single package.

2.4.1. 8IO Board

When programming the REFLECS, the 8IO must be listed as one 16AI board and one 8RO board.

The 8IO combination input and output board is a communication board designed to provide input and output functions within the same board when space restrictions do not allow for installation of dedicated boards. Like the 16AI and the 8RO, the 8IO must be connected to the REFLECS to perform input retrieval and output transmission functions. The 8IO has input and form C relay output connections for monitoring of sensors and control of loads. Since the 8IO has no memory capability, the hand-held terminal jack is removed from the board. The 8IO is shown in ***Figure 2-8***.



LEGEND			
1	Termination Resistance Jumpers	8	Output Connections (8 places)
2	LED Power Indicator	9	Input Connections
3	I/O Network Connection	10	Analog Outputs
4	Fail-Safe Dip Switch	11	Input Type Dip Switch
5	LED Output Indicators	12	Power Output Connection
6	Network Address Rotary Dials	13	AC Power Input Connection
7	Relay Output Fuses (under cover)	14	4AO Enable Jumper (JU4)

26501010

Figure 2-8 *- 8IO Combination Input/Output Communication Board*

2.4.2. Case Controller

CPC offers a variety of case controllers depending on the valve control approach being used. Because of this variety, and the multiple power modules that are available, a complete overview of case control is provided in **Section 5, *Case Control***.

2.5. 485 Alarm Panel

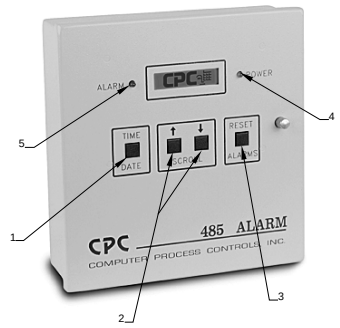
One of the most important requirements of any network environment is its ability to notify personnel of system failures or possible problems. The REFLECS is designed with sophisticated logging, graphing, notification, and alarming features that put system data at the fingertips of the service technician or store manager. However, no network is complete without the basic ability to provide annunciated alarms in the event of serious system problems.

CPC uses the 485 Alarm Panel ***(Figure 2-9)*** to accomplish this task. The 485 Alarm Panel is linked to all REFLECS Controllers through the RS485 COM B Host Network. Although the alarm panel has many features that make it a powerful notification tool, the primary and most important function of the alarm panel is to receive signals from the REFLECS and deliver an alarm annunciation.

The REFLECS constantly compares real time system conditions against user-defined alarm set points. When a system reading falling outside of these set points is detected by the REFLECS, a signal is sent to the alarm panel, which in turn emits an alarm signal and displays the alarm information on the notification screen. Other features of the alarm panel provide the user with additional information and capabilities:

- Alarm reset
- Date and time adjustment
- Storage of twenty separate alarms
- Audible annunciation can be set to either pulsed or continuous mode
- Interfaces with existing facility alarm system
- 25-pin parallel printer interface port.

Wiring of the alarm panel to the REFLECS is discussed in **Section 5.3.,** *COM B Wiring*.



LEGEND			
1	Date/Time Button	4	LED Power Indicator
2	Screen Scroll Buttons	5	LCD Alarm Screen
3	Alarm Reset Button	6	LED Alarm Indicator

26509002

Figure 2-9 *- 485 Alarm Panel*

2.6. Hand-Held Terminal

The Hand-Held Terminal (HHT), shown in ***Figure 2-10***, connects directly to the RJ11 jack on a case controller and is used to make set point and setup adjustments during system start-up or for routine or emergency maintenance. The HHT displays several screens for viewing refrigeration system status, making control set point adjustments, and bypassing loads on or off. Set point changes made through the HHT are transferred to the RMCC by the case controller and overwrite any existing set points.

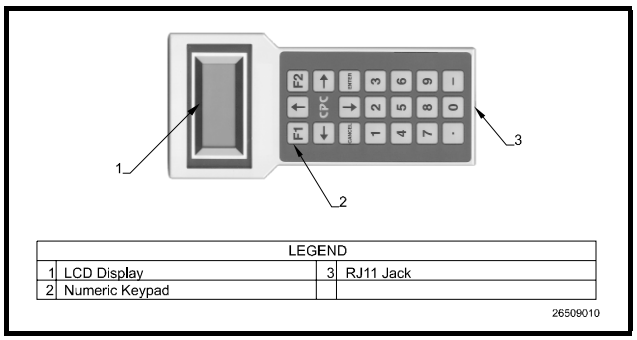


Figure 2-10 *- Hand-Held Terminal*

2.7. Remote Communication

2.7.1. RS232 Bus Amplifier

The RS232 Bus Amplifier (P/N 812-1800), shown in ***Figure 2-11***, is used to connect CPC controllers together as an integrated communication system. Communication problems sometimes associated with large control systems—such as limited cable lengths, data rate limitations, and terminal and modem communication interference—are eliminated through the use of the RS232 Bus Amplifier.

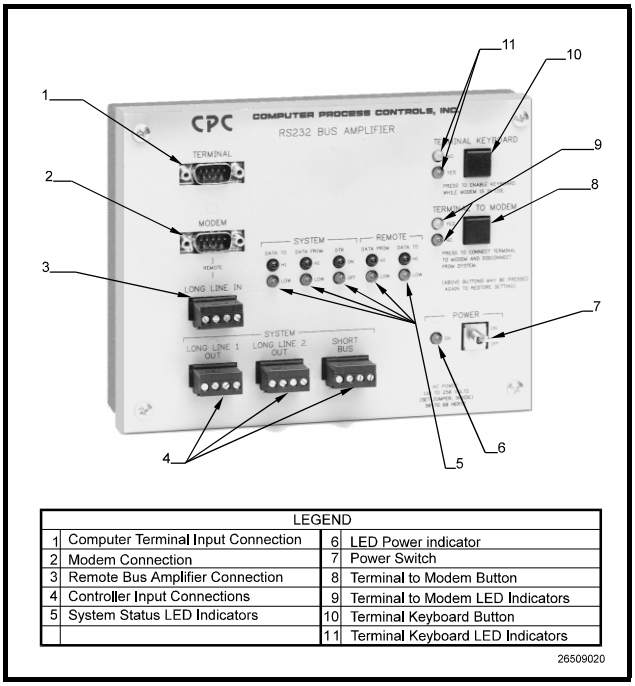


Figure 2-11 *- RS232 Bus Amplifier*

2.7.2. Modems

To communicate with a site from a remote location, the network must be connected to a modem directly, or through the RS232 Bus Amplifier. CPC supplies a standard 14400 fax/9600 data modem (P/N 370-9600) for use with the REFLECS network.

The REFLECS and CPC's RS232 Remote Communication Network are designed to connect to and be compatible with most modems in use today. Remote communication screens allow the user to define modem type, baud rate settings, automatic dial-out functions, and auto-polling.

2.7.3. UltraSite™

Remote communication with a site controlled by the REFLECS is accomplished using UltraSite, CPC's remote communication software package. UltraSite is a Microsoft® Windows™-based program that uses animated graphics, icon buttons, and tabular and graphical data to display real-time conditions of any site.

UltraSite accesses any site controller through the on-site modem, and, if present, the RS232 Bus Amplifier. All commands available through the front panel of the REFLECS may be accessed through UltraSite using pop-up dialog boxes that duplicate information displayed on the screen of the controller. Changes made to set points in the dialog boxes are immediately transferred to the unit. Control of the system using the new parameters is instantaneous.

Although most users will make alterations to the system using the front panel of the REFLECS, individuals who have access to a laptop computer may find it easier to enter data—especially during start-up—using UltraSite. A list of the available UltraSite user guides are listed below:

Part No.	Description
026-1002	UltraSite User's Guide
026-1003	UltraSite User's Guide BEC Supplement
026-1004	UltraSite User's Guide BCU Supplement
026-1005	UltraSite User's Guide RMCC Supplement

Table 2-1 *- UltraSite User's Guides*

3 Hardware Mounting

Hardware Mounting provides all information necessary to assemble a refrigeration system control network.

3.1. Refrigeration Monitor and Case Control

Location

The operating environment of the RMCC is -20°F (-28.9°C) to 120°F (48.9°C), and 0% to 95% humidity—non-condensing.

The Refrigeration Monitor and Case Control (RMCC) is the main controller of the CPC refrigeration control network. As such, it is the component most accessed by store managers and service technicians. The RMCC should be located in an easily accessible area, but away from customers and most supermarket employees. Generally, the RMCC is mounted on the rack by the rack manufacturer.

For information on setting up all components of a standard refrigeration system control network, see **Section 10,** *System Configuration Guide*.

Mounting

The REFLECS is supplied with four mounting holes in the rear panel of the enclosure. These holes are accessible without removal of any boards inside the enclosure. ***Figure 3-1*** shows the enclosure dimensions and weight.

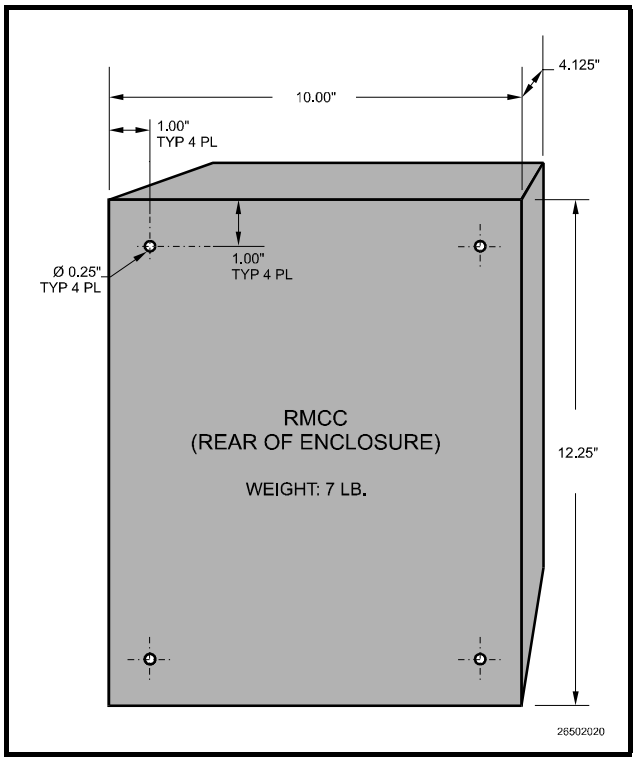


Figure 3-1 *- RMCC Mounting Dimensions*

3.2. I/O Boards and Enclosures

Location

The 16AI Input Board; 8RO, 8RO-FC, 8DO, and 4AO Output Boards; and 8IO Combination Input/Output Board are usually installed within the refrigeration rack or the condenser by the equipment manufacturer. Therefore, the installer need only make the necessary connections between the REFLECS, the condenser boards, and the refrigerated cases.

In some instances, an installer may be required to mount an I/O board. There are no restrictions on the location of these boards; however, for ease of network configuration, it is recommended that the boards be located adjacent to the REFLECS. If the boards are not located near the REFLECS, ensure the leg and segment length restrictions described in **Section 4.6.** are followed. The I/O boards may be mounted without an enclosure, but should be mounted in a location that is not easily accessible to avoid tampering or damage.

Mounting

Single Enclosure Mounting

The Single enclosure is supplied with four mounting holes in the rear panel of the enclosure. These holes are ac-

cessible without removal of any boards inside the enclosure. ***Figure 3-2*** shows the enclosure dimensions and weight. ***Figure 3-6*** shows mounting dimensions for the 8RO and 16AI. ***Figure 3-7*** shows mounting dimensions for the 8RO-FC.

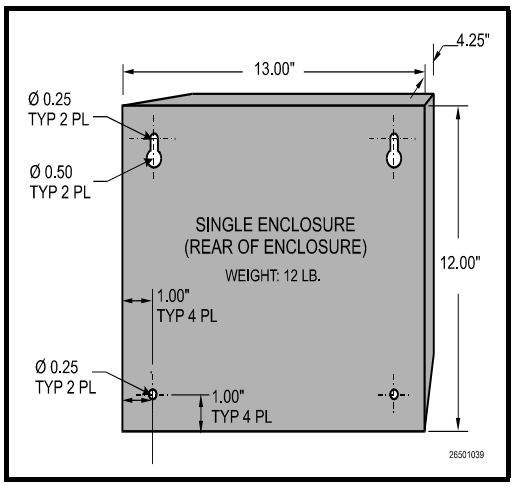


Figure 3-2 *- Single Enclosure Mounting Dimensions*

Double Enclosure Mounting

The Double enclosure is supplied with four mounting holes in the rear panel of the enclosure. These holes are accessible without removal of any boards inside the enclosure. ***Figure 3-3*** shows the enclosure dimensions and weight. ***Figure 3-6*** shows mounting dimensions for the 8RO and 16AI. ***Figure 3-7*** shows mounting dimensions for the 8RO-FC.

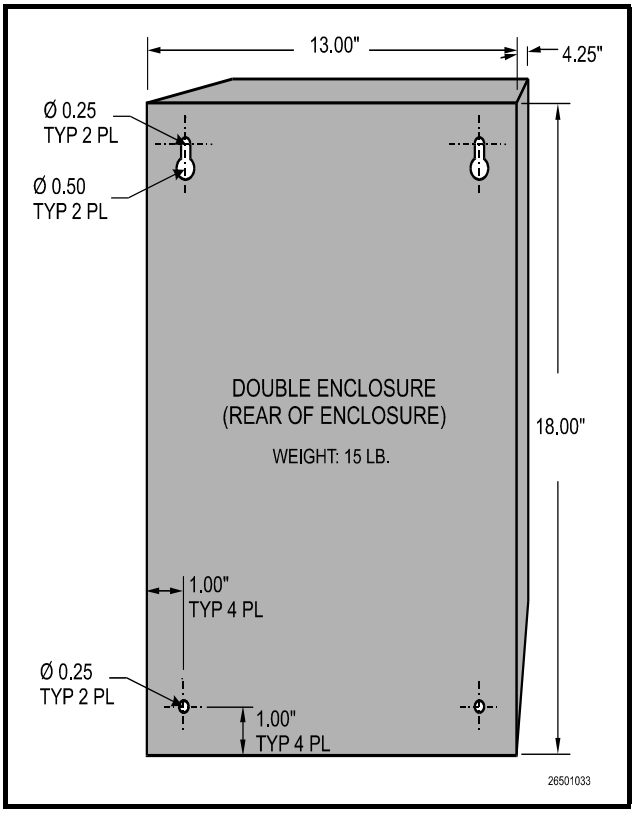


Figure 3-3 *- Double Enclosure Mounting Dimensions*

8IO Weather Resistant Enclosure Mounting

The 8IO Combination Input/Output Board is generally supplied with a weather resistant enclosure.

The weather resistant enclosure is supplied with four mounting holes on flanges at the top and bottom of the enclosure. These holes are accessible without access to the inside of the enclosure. ***Figure 3-4*** shows the enclosure dimensions and weight. ***Figure 3-8*** provides mounting dimensions for the 8IO.

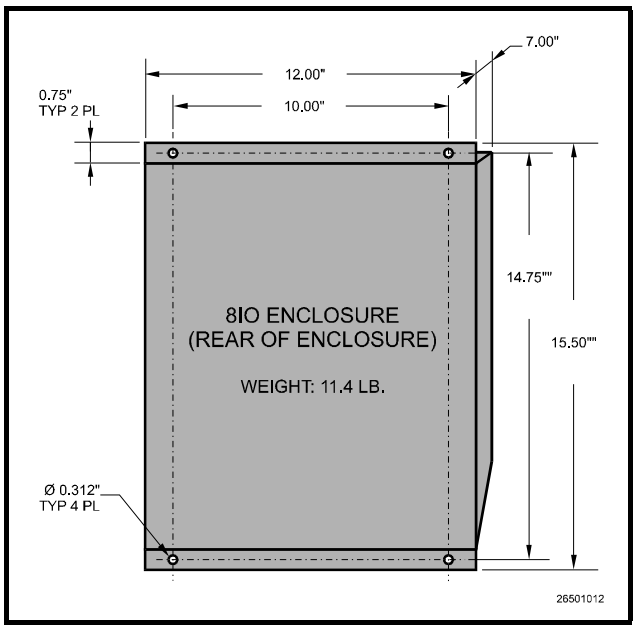


Figure 3-4 *- Weather Resistant Enclosure*

16AI, 8RO, and 8DO Boards Without Enclosures Mounting

16AI, 8RO, and 8DO boards not supplied with an enclosure are supplied with a snap-track for easy installation. The insulation sheet and I/O board must be removed from the track, and the track mounted using the.1875-inch mounting slots. ***Figure 3-5*** shows this installation procedure. ***Figure 3-6*** provides mounting dimensions for the 16AI and 8RO board.

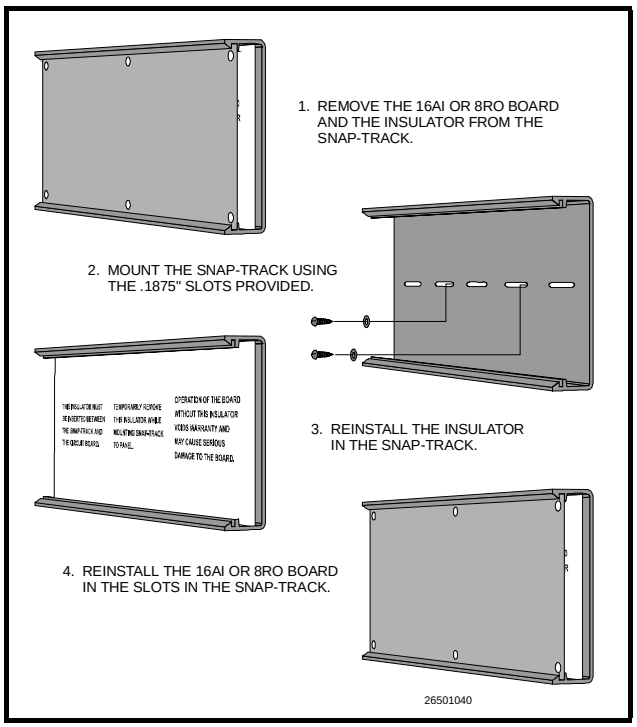

1. REMOVE THE 16AI OR 8RO BOARD AND THE INSULATOR FROM THE SNAP-TRACK.
2. MOUNT THE SNAP-TRACK USING THE .1875" SLOTS PROVIDED.
3. REINSTALL THE INSULATOR IN THE SNAP-TRACK.
4. REINSTALL THE 16AI OR 8RO BOARD IN THE SLOTS IN THE SNAP-TRACK.
26501040

Figure 3-5 *- 4AO, 8RO, or 16AI Snap-Track Installation*

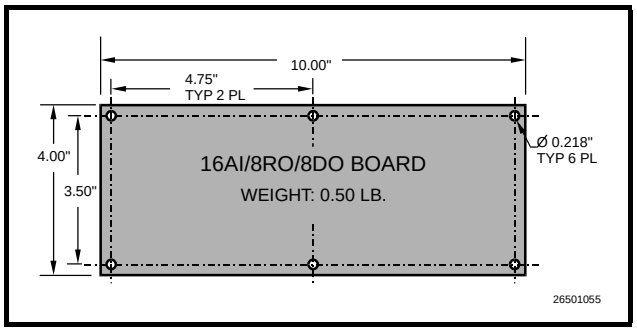


Figure 3-6 *- 16AI/8RO/8DO Mounting Dimensions*

8RO Form C Boards Without Enclosures Mounting

The 8RO Form C board is slightly larger than the 16AI and 8RO boards, and is not supplied with a snap-track. If the 8RO-FC is supplied without an enclosure it is supplied with.500-inch long metal stand-off dowels which are

pressed into the mounting holes in the board. ***Figure 3-7*** shows the mounting dimensions for the 8RO-FC.

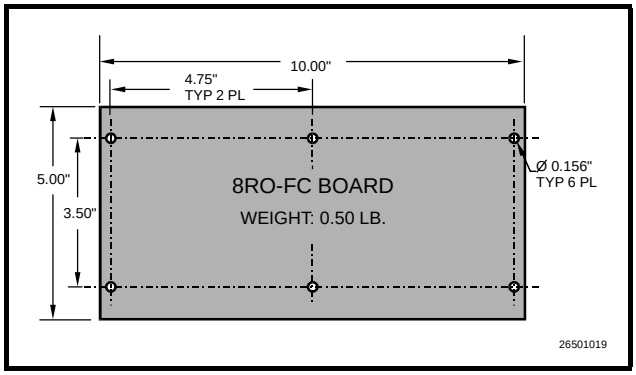


Figure 3-7 *- 8RO-FC Mounting Dimensions*

8IOs Without Enclosures Mounting

8IO boards not supplied with an enclosure are supplied with.500-inch long metal stand-off dowels that are pressed into the mounting holes in the board. ***Figure 3-8*** shows the mounting dimensions for the 8IO Board.

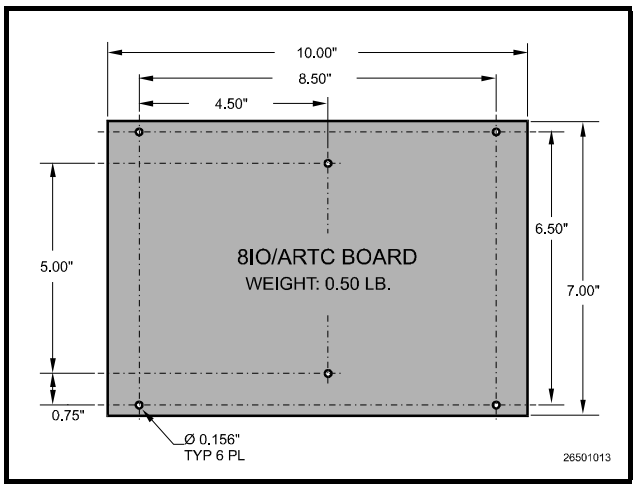


Figure 3-8 *- 8IO/ARTC Mounting Dimensions*

4AO Boards Without Enclosures Mounting

4AO boards not supplied with an enclosure are supplied with a snap-track for easy installation. The insulation sheet and I/O board must be removed from the track, and the track mounted using the.1875-inch mounting slots. ***Figure 3-5*** shows this installation procedure for 16AI and 8RO boards. Installation for the 4AO board is identical. ***Figure 3-9*** provides mounting dimensions for the 4AO board.

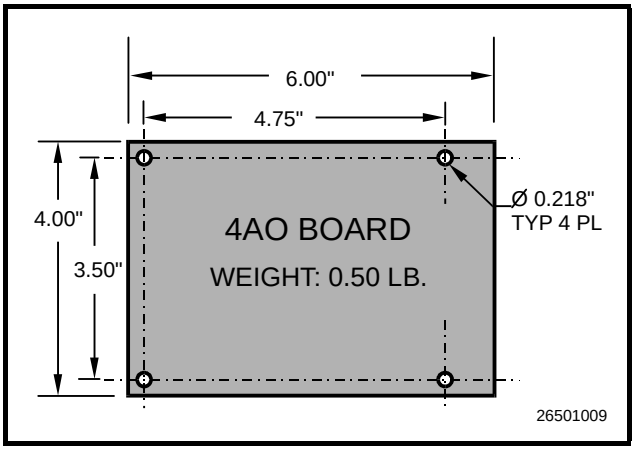


Figure 3-9 *- 4AO Mounting Dimensions*

3.3. 485 Alarm Panel

Location

The 485 Alarm Panel is used to alert store personnel to system problems that require immediate attention; therefore, it is important to mount the panel where it will be visible and easily accessible.

Mounting

The 485 Alarm Panel is supplied with four mounting holes in the rear panel of the enclosure. These holes are accessible without removal of any boards inside the enclosure. ***Figure 3-10*** shows the enclosure dimensions and weight.

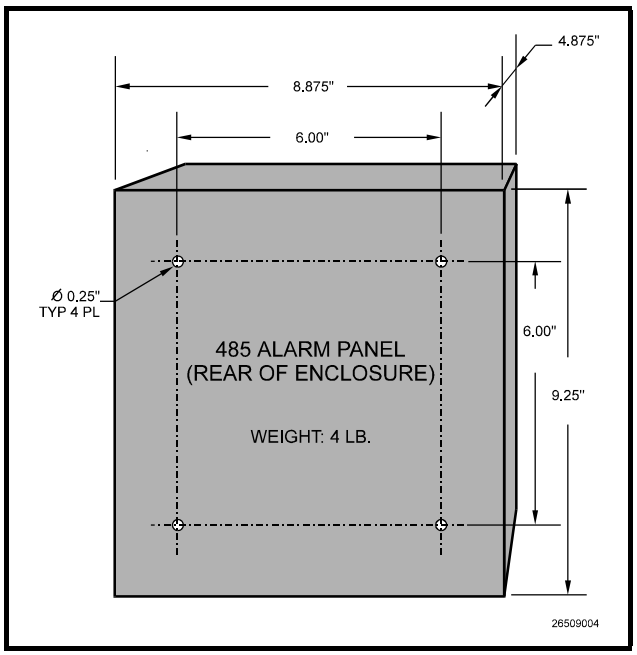


Figure 3-10 *- 485 Alarm Panel Mounting Dimensions*

3.4. RS232 Bus Amplifier

Location

Although there are no specific location requirements for installation of the RS232 Bus Amplifier, it is recommended that the amplifier be located close to the bussed CPC controllers to prevent data loss over long cable lengths. It is also recommended that the bus amplifier be located adjacent to the modem and, if present, the local computer terminal to provide easy access to all components necessary for building control.

In some cases, location of the modem and local terminal will not allow location of the bus amplifier to both the modem and local terminal and the CPC controllers. Since data loss is possible when multiple CPC controllers transmit data over long cable lengths, it may be necessary to connect the CPC controllers to a remote amplifier adjacent to the controllers, and then connect the remote amplifier to a main amplifier connected to the modem and local terminal. For complete information on operation of the RS232 Bus Amplifier, refer to *026-1401, RS232 Bus Amplifier Installation and Operation Manual*.

Mounting

To mount the RS232 Bus Amplifier,

1. Remove the four front panel screws.
2. Remove the front panel (with circuit board attached).
3. Mount the empty amplifier body, with the power connection cut-out down.
4. Replace the front panel.

Figure 3-11 shows the enclosure dimensions and weight.

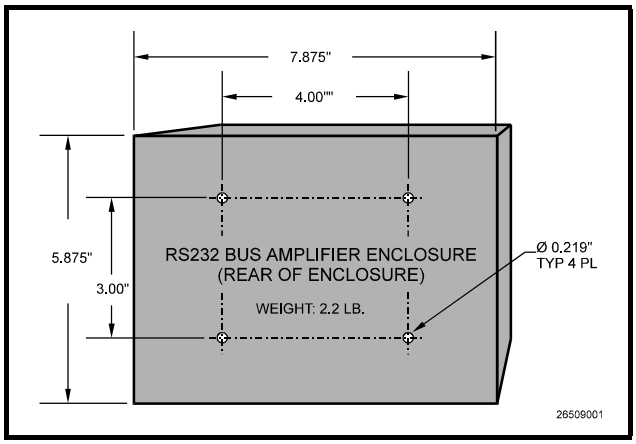


Figure 3-11 *- RS232 Bus Amplifier Mounting Dimensions*

3.5. Case Controller

For information regarding locating and mounting case controllers, refer to **Section 5*, Case Control***.

3.6. Pressure Transducers

CPC uses Eclipse®pressure transducers as pressure sensing devices. These transducers convert pressure readings to proportional electrical signals between 0.5 and 4.5 volts. The transducer is designed with a 1/8-inch male fine pipe thread fitting for connection to a standard access fitting. If the fitting is configured with a Schrader valve, this fitting will have to be removed and replaced with a 1/8-inch female fitting. Each pressure transducer is supplied with 20 feet of cable for connection to a 16AI input board.

Location

CPC supplies three pressure transducers: 0-100 lb. for suction pressure, 0-200 lb. for oil pressure, and 0-500 lb. for discharge pressure. Each is generally installed on the system by the equipment manufacturer. If a transducer must be added to the system, consult the refrigeration equipment manufacturer for proper location.

Mounting

In high-humidity environments, mount the transducer so that the cable is at the bottom or side. This prevents creating a moisture trap. However, if pressure media might freeze, mount the transducer with the pressure port pointing down.

3.7. Temperature Sensors

3.7.1. Outside (Ambient) Temperature Sensor

Location

The outside or ambient temperature sensor should be located on the north side of the building, preferably under an eave to prevent sun-heated air from affecting the temperature at the sensor.

Mounting

The temperature sensor may be mounted using any standard tubing clamp. CPC also offers an aluminum cover and clamp which may be mounted as shown in ***Figure 3-12*** (fasteners are not provided).

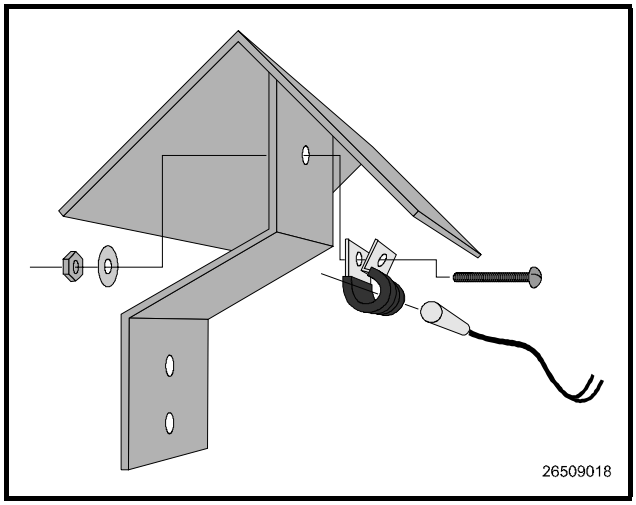


Figure 3-12 *- Outside Temperature Sensor with Cover and Clamp*

3.7.2. Refrigeration System Temperature Probes and Sensors

Location

CPC supplies several temperature monitoring devices including bullet sensors, pipe mount sensors, immersion probes, insertion probes, and sensors for high temperature applications. Each of these sensors is generally installed on the system by the equipment manufacturer. If a device must be added to the system, refer to the information supplied with the device and consult the refrigeration equipment manufacturer. ***Table 3-1*** lists some typical sensor applications and the sensor or probe most suited for that purpose. The use of these devices is not limited to these applications, however. Refer to ***Table 5-1*** for wiring of these device types.

Application	Sensor Type
Condenser Outlet (Drop Leg)	High Temperature Bullet
Liquid (Manifold)	Pipe Mount
Suction Temperature	Pipe Mount
Discharge Air	Bullet
Ambient Temperature (Outside)	Bullet
Condenser Sump	Insertion Probe
Defrost Termination	Bullet

Table 3-1 *- Sensor Application and Type*

Mounting Bullet and Pipe Mount Sensors

Bullet or pipe mount sensors mounted on refrigerant lines should be secured with a Panduit low temperature cable tie, number PLT2S-M120, or equivalent. For pipe mount sensors, the curved surface should be placed against the pipe and the tie should be positioned in the groove on the top surface of the sensor. A second tie should be used to secure the lead to the pipe for additional support.

Sensors located on refrigerant lines should be insulated to eliminate the influence of the surrounding air. A self-adhering insulation that will not absorb moisture is recommended to prevent ice logging at the sensor location.

Depending on the size of the refrigeration line, the sensor should be positioned as shown in ***Figure 3-13***.

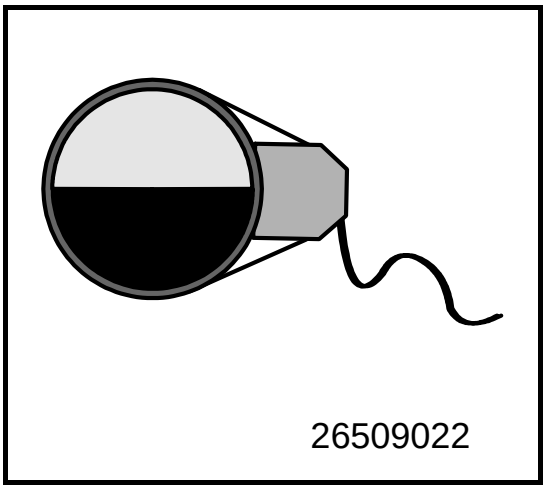


Figure 3-13 *- Sensor Orientation*

3.8. Liquid Level Sensors

CPC supplies both a probe (207-1000) and float (207-0100) type liquid level sensor. Each is installed by the refrigeration and equipment manufacturer. ***Table 5-1*** shows how to wire both kinds of liquid level sensors to a 16AI.

When setting up the probe in the RMCC system software, specify the probe as a linear sensor with a gain of 20 and an offset of zero. See **Section 7.6.2.*, Setup*** and **Section 7.6.4.*, Set Points (for Linear sensor types only)*** for specific software setup instructions.

3.9. Leak Detectors

CPC supplies both a refrigerant transducer (809-1550) and Checkit refrigeration system monitor (508-2000) for monitoring refrigerant leaks. Each is installed by the refrigeration and equipment manufacturer. If a replacement transducer or Checkit must be installed in the field, complete installation and operation instructions are available in either *026-1302, Refrigerant Transducer Installation and Operation Manual*, or *026-1303, Checkit Refrigeration System Monitor Installation and Operation Manual*.

3.10. Power Monitoring

The current transformer, watt-hour transducer, and transducer power supply are all required to perform power monitoring. CPC uses standard off-the-shelf configurations of each of these products. Installation instructions supplied with the units should be used for both the watt-hour transducer and the transducer power supply. A single current transformer should be located on each phase of the incoming power supply of the motor room.

3.11. Transformers

Transformers are required for all input and output communication boards and case controllers. The transformer should be located within 10 feet of the board it is powering, preferably within the board enclosure. CPC supplies four types of transformers for standard refrigeration applications: three board transformer, six board transformer, 10 board transformer, and 8IO/ARTC transformer. The multiple board transformers may not be used to power an 8IO or ARTC.

4 The REFLECS Networks

The REFLECS uses four separate networks:

1. The **RS485 Input/Output (I/O) Network** (COM A) connects the controller to the input and output communication boards.
2. The **RS485 Host Bus Network** (COM B) connects multiple controllers to a 485 alarm panel.
3. The **RS232 Remote Communication Network** (COM C) connects multiple controllers to a modem, thus allowing remote communication.
4. The **RS485 Input/Output (I/O) Network** (COM D) is an additional I/O network that connects the controller to the input and output communication boards.

The following sections provide an overview of the basic network components and their function. Wiring requirements for each of the networks is provided in **Section 4.4.,** *Wiring.*

4.1. RS485 Input/Output (I/O) Network (COM A and D)

The RS485 Input/Output (I/O) network connects all input and output communication boards together in an open communication loop. This loop connects the REFLECS to multiple input and output communication boards, and terminates at the last input or output board on the network. The term “daisy-chain” is sometimes applied to this open loop arrangement.

The REFLECS is configured to monitor and control two separate RS485 input/output communication networks. These two networks are labeled as either COM A or COM D. Each network is capable of supporting up to 31 separate input or output boards, plus the single REFLECS controller. This means that a single REFLECS can monitor or control up to sixty-two individual input or output boards. ***Figure 4-1*** shows the I/O network configurations.

The concept of a loop is critical to operation of the I/O network. The REFLECS cannot properly interact with the input and output boards unless the boards are connected and identified within the confines of the loop. The I/O network is always identified as COM A or COM D on the controller. Input and output communication boards are configured with a RS485 network connection only, which can be used to connect the board to either COM A or COM D.

In addition to the primary loop arrangement, a single star configuration may be connected to the loop. A more in-depth explanation of CPC network wiring practices is provided in **Section 4.4.,** *Wiring.*

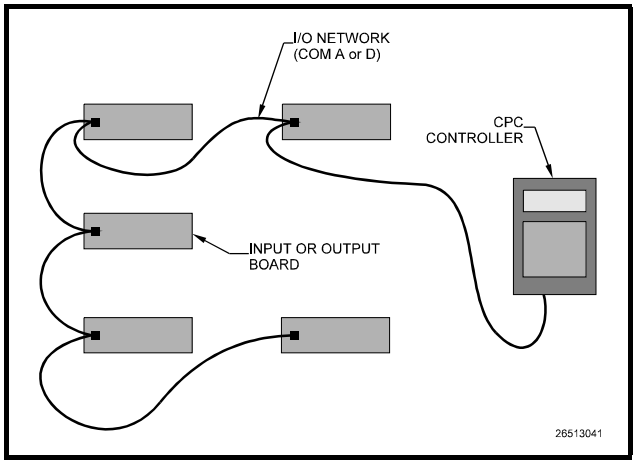


Figure 4-1 *- Network Loop Wiring Configurations*

4.2. RS485 Host Network (COM B)

Similar to the I/O network loop, the host network, shown in ***Figure 4-2***, also uses an open loop configuration. The primary function of the Host Network Loop is to allow single or multiple REFLECS Controllers to be connected together to one common 485 Alarm Panel. The Host Network is always labeled as COM B on the REFLECS. Input and output boards cannot be connected directly to the host network.

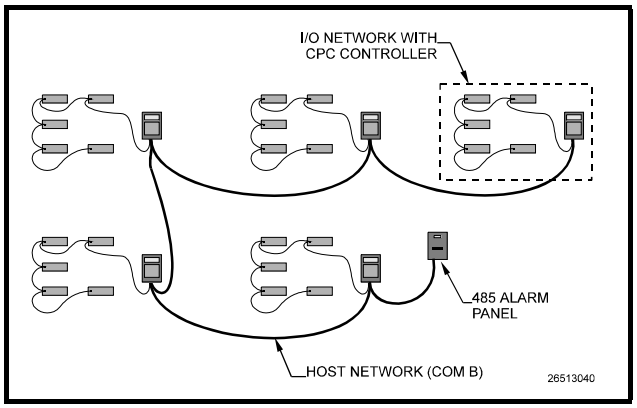


Figure 4-2 *- RS485 Host Communication Network (COM B)*

4.3. RS232 Remote Communication Network (COM C)

The RS232 Remote Communication Network connects single or multiple REFLECS Controllers to a modem to provide remote access using a remote communication software package. In some configurations, an RS232 Bus Amplifier may be installed to improve transmission rates and

overall data quality. Like the host network, input and output boards cannot be connected directly to the remote communication network. ***Figure 4-3*** shows a typical remote communication network layout.

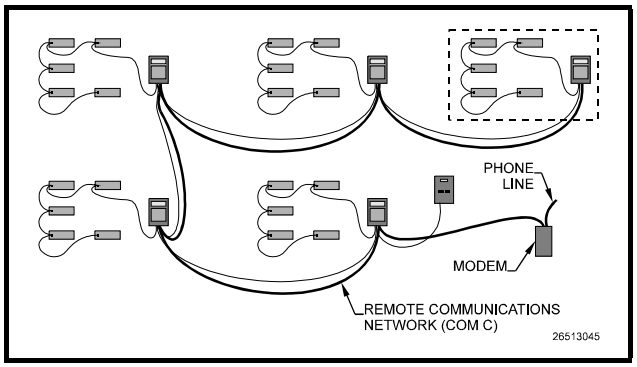


Figure 4-3 *- RS232 Remote Communication Network (COM C)*

4.4. Wiring

4.4.1. Overview

All CPC I/O and host bus communication components (COM A and D, and COM B) have been designed to conform to RS485 standards. Remote communication components (COM C) have been designed to conform to RS232 standards. When wiring CPC components together, it is necessary to follow the rules and requirements specified in this section to ensure proper communication between network devices and effective control of refrigeration control equipment. Unless noted, all information in this section pertains to COM A, B, C, and D networks. Information provided in **Section 3,** *Hardware Mounting*, conforms to these requirements.

4.5. Legs and Segments

A leg is defined as a cable running between two devices such as two communication boards, or a REFLECS unit and a communication board. A segment is defined as the total combined length of all legs connected to one REFLECS power interface board output connection such as the COM A or COM D connections. ***Figure 4-4*** demonstrates the relationship between legs and segments.

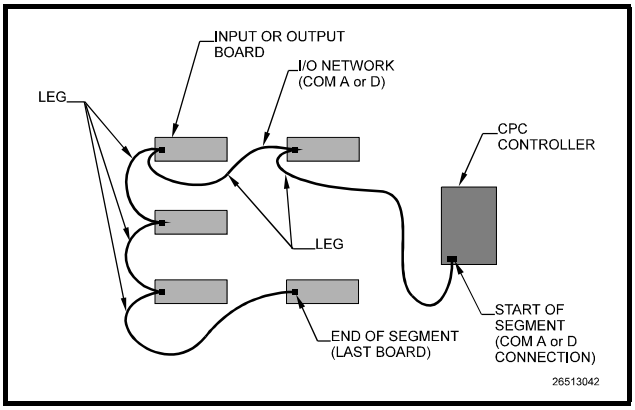


Figure 4-4 *- Relationship Between Legs and a Segment*

4.6. Leg and Segment Wire Length

A single segment connected to COM A, B, or D may not exceed 4000 feet. Therefore, the combined length of all legs in a single segment may not exceed 4000 feet. This length restriction includes the length of legs in a single star configuration described in **Section 4.9.,** *Star Configurations*.

A single segment connected to COM C may not exceed 2500 feet.

4.7. Number of Devices per Segment

A single segment beginning with a REFLECS controller may have no more than 31 additional devices. A device is considered to be any controller, board, or alarm panel. There are restrictions to the number of each board type that may be connected to the COM A and D networks.

No more than sixteen 8ROs or 8RO-FCs, sixteen 16AIs, three 4AOs, and two 8DOs may be connected to both the COM A and COM D networks at the same time. In addition, an 8IO board must be listed as one 16AI and one 8RO.

4.8. Daisy Chains

Except for the single star configuration described below, all devices in a segment must be connected in an open loop or “daisy chain” configuration. A daisy chain must start with the first device in the segment and continue to the last device. Branching from a device in the middle of the segment is prohibited. ***Figure 4-5*** demonstrates correct and incorrect daisy chain configurations.

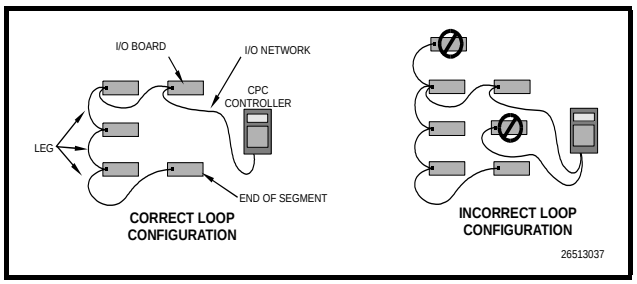


Figure 4-5 *- Correct and Incorrect Loop Configurations*

4.9. Star Configurations

Within a single segment, a single star branching from a single device is allowable. A star is multiple devices connected to a single device within a segment. The device from which the star extends is called the hub. The legs within a star may not exceed 100 feet. No more than one star in a single segment is permitted. Star configurations are not permitted on the COM B, Host, and COM C, Remote Communication, networks. ***Figure 4-6*** shows correct and incorrect star configurations.

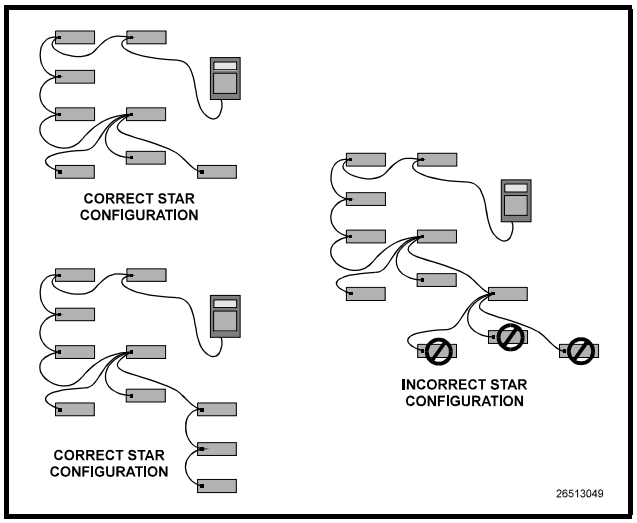


Figure 4-6 *- Correct and Incorrect Star Configurations*

4.10. Terminating Resistance Jumpers (COM A, COM B, and COM D Only)

Each device that may be connected to a network segment has a set of terminating resistance jumpers (one jumper for each wire lead). These jumpers are always labeled JU1, JU2, and JU3 for COM A. COM B jumpers are always labeled JU4, JU5, and JU6. COM D jumpers are always labeled JU9, JU10, and JU11.

The purpose of the jumpers is to indicate the two ends, or termination points, of the segment. If a segment contains a star, the hub of the star must be one of the segment termination points. The other termination point in the star configuration is the longest leg contained in the network.

If a device is at either end of a segment in a daisy chain configuration ***(Figure 4-7)***, or if the device is the hub of a star configuration ***(Figure 4-8)***, the terminating resistance jumpers must be set in the up position. All other devices in a segment should have their jumpers set to the down position. No segment shall have more than two devices with the terminating resistance jumpers in the up position.

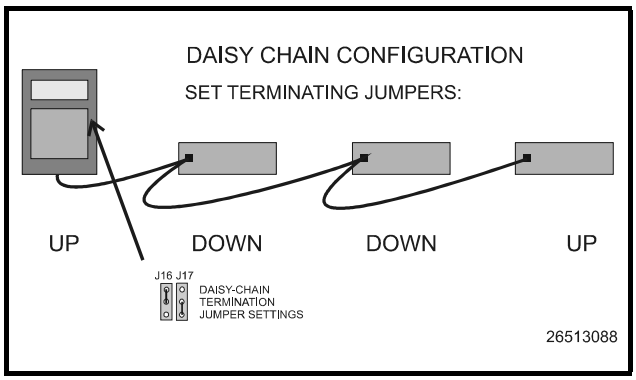


Figure 4-7*-Terminating Jumpers for a "Daisy Chain" Configuration*

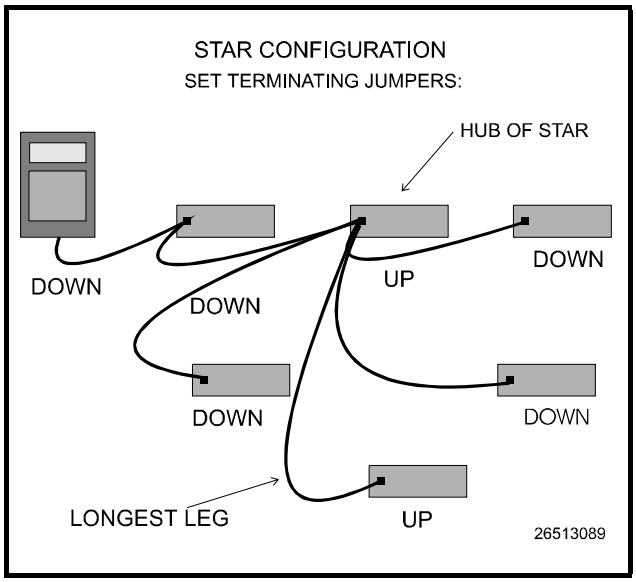


Figure 4-8*-Jumper Settings for Star Network*

4.11. Network Dip Switches and Rotary Dials (COM A and D only)

Each device that may be connected to a segment has either a network dip switch or rotary dials that provide a unique identifier for each device on the network. Devices on a segment may numbered in any order; however, gaps or omissions in the numbering sequence are not permitted. As an example, if a segment contains four devices, then board addresses one, two, three, and four must be used; one, two, three, and five would not be permitted.

In addition, when setting network dip switches and dials, both COM A, COM B, and COM D must be considered together. If the last device on COM A is numbered five, then the first device on COM D must be numbered six.

The REFLECS automatically identifies the board types on the network; therefore, boards that are the same type are numbered together. For example, if a segment contains four 16AI boards and five 8RO boards, the 16AIs are numbered one, two, three, and four; and the 8ROs are numbered one, two, three, four, and five. ***Figure 4-9*** provides a graphic representation of board numbering. Actual dip switch and rotary dial setup is described fully in **Section 5.8.1.1.,** *Dip Switches*.

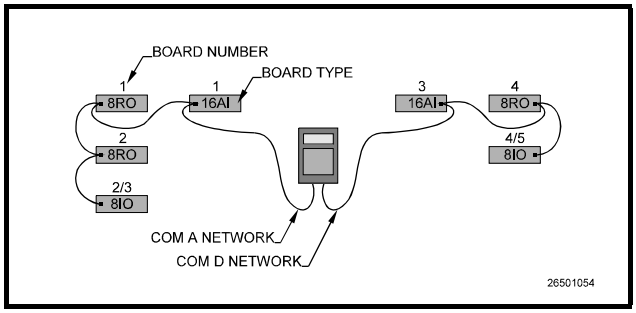


Figure 4-9 *- Network Device Numbering*

4.12. Baud Rate Dip Switches (COM A and D only)

All networks (COM A, B, C, D) have specific baud rate requirements; however, only COM A and COM D require manual setting of the baud rate dip switch. Currently, the baud rate dip switch in network components may be set at either 4800, 9600, 19,200, and 38,400. Setting of the baud rate is accomplished using switch S1 on the REFLECS processor board, the RS485 alarm panel board, and 4AO, 8RO, and 8RO-FC output boards; and switch S3 on the 16AI input board. The COM B baud rate is preset on the REFLECS and 485 Alarm Panel dip switch S1 at 4800. The 8IO board automatically adjusts to the required baud rate. Actual baud rate setup is described fully in **Section 4.14.,** *Baud Rate Settings*.

4.13. Network Settings

For all boards, except 8IO boards, the network dip switch labeled S1 (or S3 for the 16AI board) is used to set the unique board number of the unit and the baud rate. The 8IO uses rotary dials to set the board number of the unit.

4.13.1. Network Addresses

Board numbering is accomplished using the first five rockers on dip switch S3 on the 16AI board, the first five rockers on dip switch S1 on the 8RO and 8RO-FC boards, and two rotary dials on the 8IO board.

Dip Switches

Each of the first five rockers of either S1 or S3 is given a value which is twice as large as the value for the rocker to the left of it. The first rocker is given a value of one. With these five rockers, a board may be given any value between 1 and 31; however, network restrictions limit the actual number of boards that may reside on both the COM A and COM D networks at one time. These restrictions are given in **Section 4.7.,** *Number of Devices per Segment.* Use ***Figure 4-10*** to determine the switch settings for 16AI, 8RO, and 8RO-FC boards.

If a pulse type input is connected to a 16AI Board with software older than version E.02, the input must be connected to point one, and rocker number eight on the board's network dip switch and must be configured to the ON or up position.

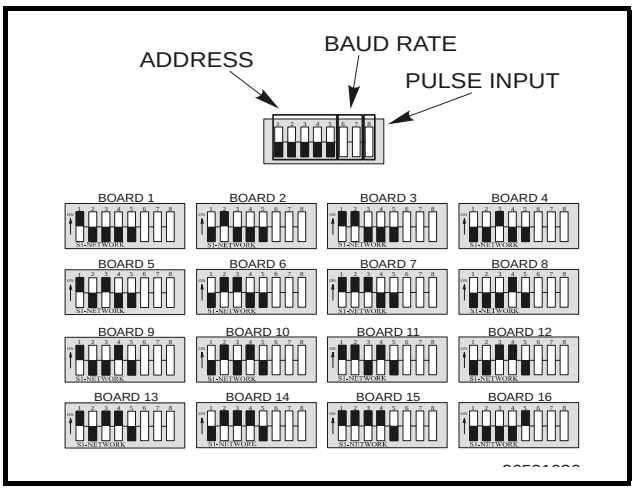


Figure 4-10 *- Network Address Settings for Dip Switch S1 or S3 on I/O Boards*

Numbering 8IO Boards

The 8IO board uses rotary dials to set the network address instead of dip switches. The rotary dial S1 is used to define the output portion of the board. Therefore, the board may only be defined as board 1 through 9. Likewise, dial

S2 is used to define the input portion of the board and may be set from 1 to 9.

LED Indicator Lights

Each board contains a green LED Power Indicator Light. This light indicates whether or not the board is receiving power. It is also a good indication if the board is on-line when the LED pulses.

4.14. Baud Rate Settings

The COM A and D networks may be set to either 4800, 9600, 19,200, or 38,400 baud. Positions one and two of the dip switch located on the processor board of the RMCC are used to set the baud rate. A different baud rate setting may not be set for the COM A and D networks.

Positions six and seven on dip switch S1 of the 4AO, 8RO, and 8RO-FC, and switch S3 of the 16AI, are used to set the baud rate for the communication boards. This baud rate should match the setting for the RMCC. ***Figure 4-11*** shows the possible baud rate settings and dip switch positions for the COM A and D networks.

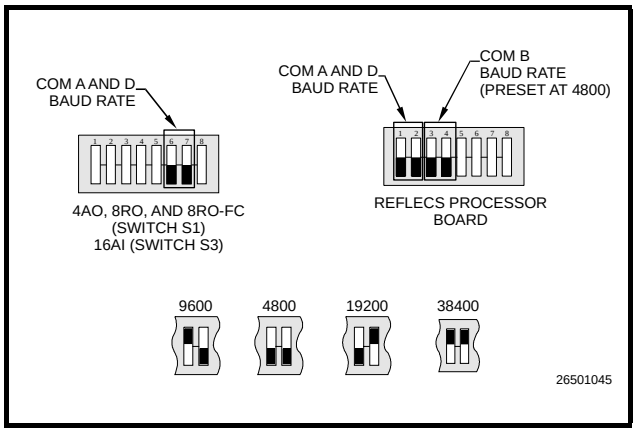


Figure 4-11 *- Baud Rate Dip Switch Settings*

4.14.1. Case Controllers

If using case controllers, the baud rate setting for COM A and D must be set to 19,200 since the baud rate for the case controller is hard-coded at 19,200. Refer to **Section 4.12.,** *Baud Rate Dip Switches (COM A and D only),* for more information.

4.14.2. 8IO

Baud rate settings for the 8IO board are automatically adjusted by the board based on the baud rate setting of the RMCC. The 8IO and ARTC can communicate at baud rates between 4800 and 38,400 baud.

4.14.3. COM B

The COM B baud rate is preset on the RMCC and 485 Alarm Panel dip switch S1 at 4800 baud since the 485 alarm panel can only communicate at 4800 baud.

4.14.4. COM C

The COM C baud rate setting is established within the remote communications screens in the RMCC and is related to the speed of the modem being used at the store. The RMCC can communicate at 300, 1200, 2400, and 9600 baud. It is recommended that a baud rate of 9600 be used for remote communication.

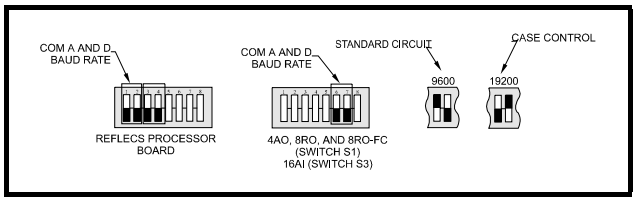


Figure 4-12*-Baud Rate Dip Switch Settings*

4.15. Fail-Safe Dip Switch Settings

CPC uses two fail-safe devices on its output boards: a dip switch and jumpers. These two devices are used to provide fail-safe operation of equipment in the event of either power loss or network communication loss. The use of these devices differs depending on the board or controller.

Boards using Form C contacts do not have fail-safe devices, since the contacts are wired for the position required during power loss, but have a dip switch which illuminates the LED relay indicator depending on the contact position.

The 8RO has both a fail-safe dip switch (S2) to force the contacts open or closed if the network fails, and a jumper for each output (JU4 through JU11) that forces the contact open or closed during a power loss. ***Figure 4-13*** shows the possible settings for the dip switch and jumpers.

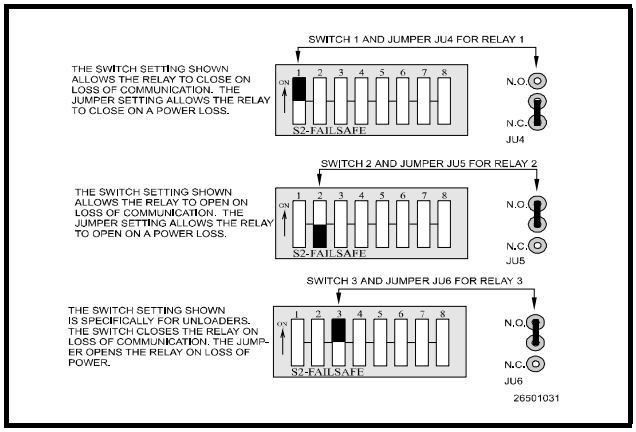

SWITCH 1 AND JUMPER JU4 FOR RELAY 1
THE SWITCH SETTING SHOWN ALLOWS THE RELAY TO CLOSE ON LOSS OF COMMUNICATION. THE JUMPER SETTING ALLOWS THE RELAY TO CLOSE ON A POWER LOSS.
S2-FAILSAFE
N.O.
N.C.
JU4
SWITCH 2 AND JUMPER JU5 FOR RELAY 2
THE SWITCH SETTING SHOWN ALLOWS THE RELAY TO OPEN ON LOSS OF COMMUNICATION. THE JUMPER SETTING ALLOWS THE RELAY TO OPEN ON A POWER LOSS.
S2-FAILSAFE
N.O.
N.C.
JU5
SWITCH 3 AND JUMPER JU6 FOR RELAY 3
THE SWITCH SETTING SHOWN IS SPECIFICALLY FOR UNLOADERS. THE SWITCH CLOSES THE RELAY ON LOSS OF COMMUNICATION. THE JUMPER OPENS THE RELAY ON LOSS OF POWER.
S2-FAILSAFE
N.O.
N.C.
JU6
26501031

Figure 4-13 *- 8RO Board Fail-Safe Dip Switch and Jumper Settings*

The ARTC, 8IO, and 8RO-FC have a dip switch (S2) which indicates the state of the relay (NC or NO). When the relay is set normally closed, the appropriate LED relay indicator (one through eight) is illuminated. Dip switch rockers one through eight should be set to the up position if the relay is wired normally closed and down if the relay is wired normally open.

5 Communication and Power Connections

This section describes how to wire the CPC refrigeration control system. Information is provided for the REFLECS and all sensors, alarm panels, modems, loads, and output functions.

All wiring schemes shown in this section conform to the requirements outlined in **Section 5.1.,** *Wiring Specifications*.

5.1. Wiring Specifications

All CPC I/O and host bus communication components (COM A and D, and COM B) have been designed to conform to RS485 standards. Remote communication components (COM C) have been designed to conform to RS232 standards. When wiring CPC components together, it is necessary to follow the rules and requirements specified in this section to ensure proper communication between network devices and effective control of refrigeration equipment. Unless noted, all information in this section pertains to COM A, B, C, and D networks. Information provided in **Section 5**, conform to these requirements.

Network wiring must meet or exceed the following specifications:

RS485 (COM A, B, and D)

- Shielded twisted pair
- 18 - 24 AWG wire
- 31 pf/ft maximum capacity between signal wires
- 59 pf/ft maximum capacity between signal and shield
- 120 ± 50 ohm nominal impedance
- Belden part number 8641 (for plenum installations: 82641 or 88641)

RS232 (COM C)

- Shielded
- 22 AWG wire
- 23 pf/ft max cap. between signal wires
- 41 pf/ft max cap. between signal and shield
- Belden part number 8771

5.2. COM A and D Wiring

Connect the three-wire COM A or COM D network cable to the REFLECS and I/O board 485 network connections as shown in ***Figure 5-1***.

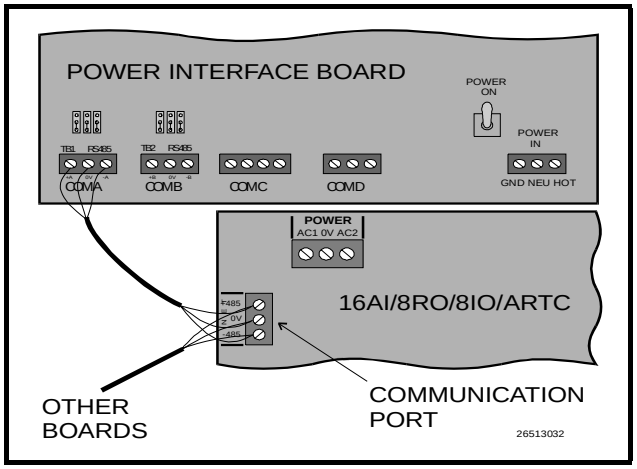


Figure 5-1 - *COM A Network Connections*

5.3. COM B Wiring

Connect the three-wire COM B network cable to the REFLECS controllers and 485 Alarm Panel as shown in ***Figure 5-2***.

.

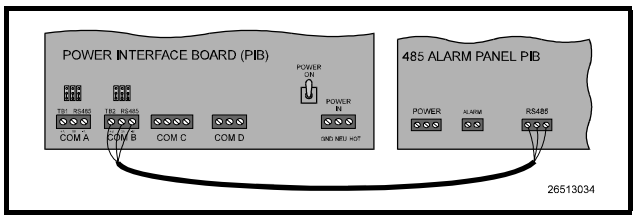


Figure 5-2 - *COM B Network Connections*

5.4. COM C Wiring

Connect the three-wire COM C network cable to the REFLECS controllers and modem as shown in ***Figure 5-3***.

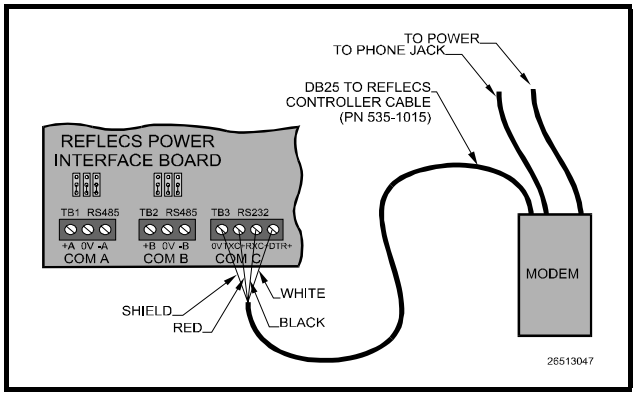


Figure 5-3 *- COM C Network Connection*

5.5. Fincor® Inverter Wiring

Fincor® brand inverters may be used to power variable-speed compressors. The following sections show how to set up a Fincor® inverter to work with REFLECS I/O boards.

Wiring is as shown in ***Figure 5-4***. The terminal strips shown in the bottom of ***Figure 5-4*** diagram correspond to the terminal strips in the lower right corner of the inverter's control board. Consult the Fincor® user's manual for more information about these terminals.

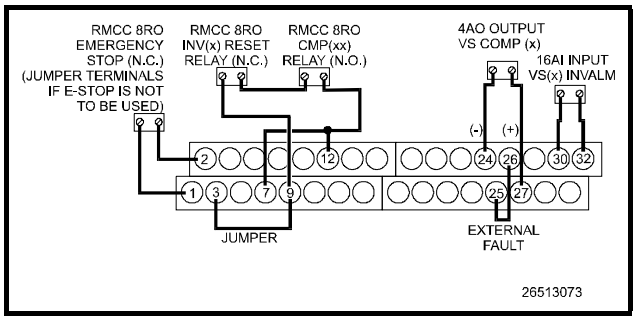


Figure 5-4 *- Fincor Inverter Control Wiring*

Fincor® Inverter Wiring Procedure

1. *E-STOP* - Terminals 1 and 2 are the inverter's emergency stop (E-STOP) contacts. When this connection is open, the inverter will be overridden off. If desired, terminals 1 and 2 may be wired to a normally closed 8RO relay so that the RMCC may be configured to stop the inverter when necessary. Otherwise, place a jumper between these terminals.
2. *Jumper 3 to 9* - Place a jumper between terminals 3 and 9.
3. *Inverter Reset Setup* - To allow the RMCC to automatically reset the inverter, connect terminal 9 to one contact of the defined INV(x) RESET relay (where X equals the group number of the compressor). Connect the other contact to the compressor relay (see step 4). The INV RESET relay must be set up in the system software (see **Section 7.9.2., *Output Definitions***).
4. *Compressor Relay* - Connect terminals 7 and 12 to one contact of the defined CMP(xx) relay (where XX equals the compressor number). Connect the other contact of the relay to the VS Alarm relay (see step 4). The CMP relay must be set up in the system software (see **Section 7.9.2., *Output Definitions***).
5. *4AO Analog Output* - A 0-10 VDC signal from a 4AO board determines the RPM of the variable-speed compressor. Wire the positive terminal of this 4AO point to terminal 27 on the inverter's contact strips. Wire the negative terminal to terminal 24. The 4AO board and point address must be set up as a variable-speed compressor output (VS COMP 1 - VS COMP 4) in the system software (see **Section 7.9.2., *Output Definitions***).
6. *External Fault* - Place a jumper across terminals 25 and 26.
7. *Fault Input* - The Fincor® inverter sends a signal to a 16AI when an inverter fault occurs. Wire the 16AI point to terminals 30 and 32 on the inverter. The 16AI board and point address must be set up as an inverter alarm (VS INVALM) input in the system software (see **Section 7.9.1., *Input Definitions***).

Dip Switches

Figure 5-5 shows how dip switches JD and JE on the inverter control board must be set. Jumper JD must be set to the ENABLE position to allow the RMCC to control the inverter. Jumper JE must be set to the DISABLE position

to disable the FWD, REV, and JOG keys on the inverter keypad.

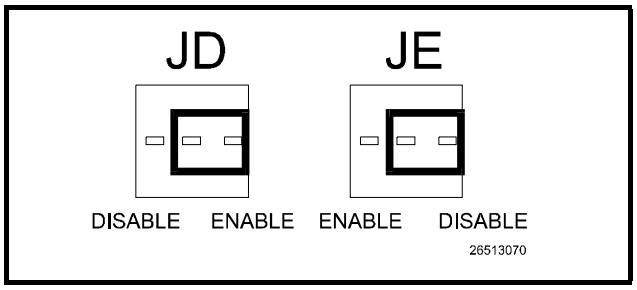


Figure 5-5 *- Fincor Inverter Dip Switch Settings*

5.6. Sensor and Transducer Wiring

Table 5-1 shows some typical sensor and transducer connections.

For a complete list of hardware and software setup instructions, refer to ***Appendix B: Sensor Hardware/Software Setup Table.***

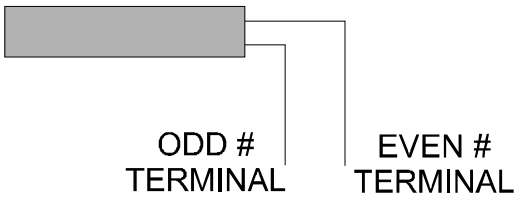
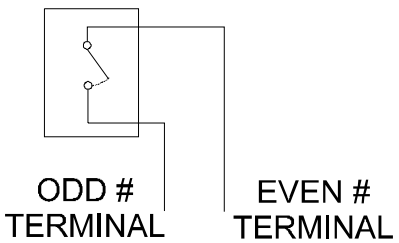
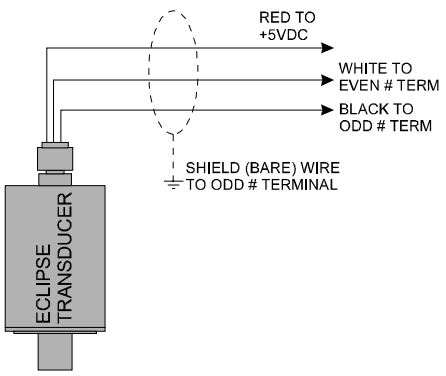
P/N	Sensor	Connect to Input Point by Board Type	Wiring
Various	Temp Sensors and Probes	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-Any Temp or Aux Input	 1. Connect one lead to the odd numbered terminal and the other lead to the even numbered terminal (polarity insensitive). 2. Set input dip switch up.
Various	Digital Sensors (Klixons, Sail Switches, etc.)	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-An Aux Input	 1.Connect one lead to the odd numbered terminal and the other lead to the even numbered terminal (polarity insensitive). 2.Set input dip switch up.
800-1100 800-1200 800-1500	Pressure Transducers (Eclipse) 100, 200, 500 lb. ratings	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-An Aux Input	1. Connect RED power wire to +5VDC supply on input board. 2. Connect WHITE signal wire to even numbered terminal. 3. Connect BLACK ground wire to odd numbered terminal. 4. Connect the bare SHIELD wire to odd numbered terminal. 5. Set input dip switch down. 

Table 5-1 *- Sensor Wiring*

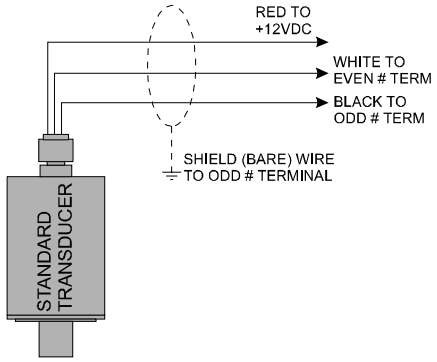
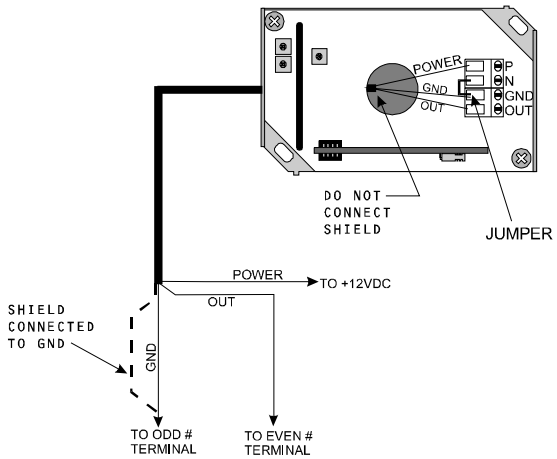
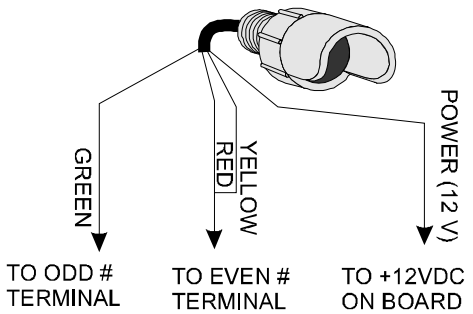
P/N	Sensor	Connect to Input Point by Board Type	Wiring
800-0100 800-0200 800-0500	Pressure Transducers (Standard) 100, 200, 500 lb. ratings	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-An Aux Input	1. Connect RED wire to +12VDC source on input board. 2. Connect WHITE signal wire to even numbered terminal. 3. Connect BLACK ground wire to odd numbered terminal. 4. Connect the bare SHIELD wire to odd numbered terminal. 5. Set input dip switch down. 
203-5750	Relative Humidity Sensor	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-An Aux Input	 1. Wire the “P” sensor terminal to 12VDC supply on board. 2. Wire the “GND” sensor terminal to odd numbered terminal. 3. Wire the “OUT” sensor terminal to even numbered terminal. 4. Jumper sensor terminal “N” to sensor terminal “GND”. 5. Set input dip switch down.
206-0002	Light Level	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-An Aux Input	1. Wire GREEN ground wire to odd numbered terminal. 2. Wire YELLOW and RED signal wires to even numbered terminal. 3. Wire the POWER wire to a +12VDC source on input board. 4. Set input dip switch down. 

Table 5-1 *- Sensor Wiring*

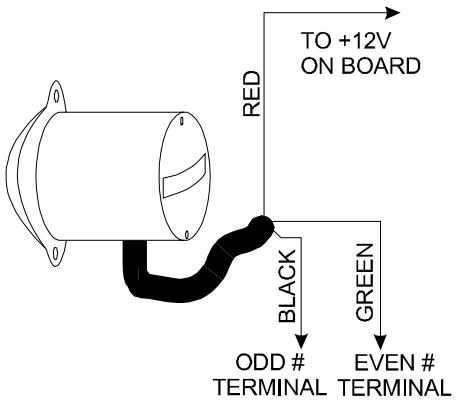
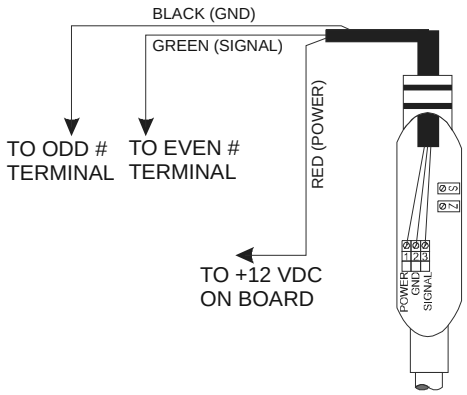
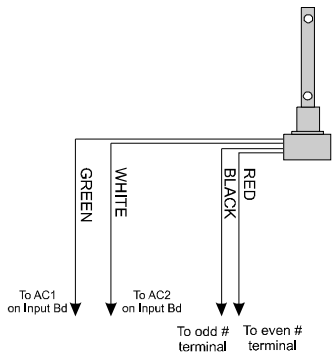
P/N	Sensor	Connect to Input Point by Board Type	Wiring
207-0100	Analog Liquid Level	**16AI**-Any Available Point **8IO**-Any Available Input Point	1. Connect RED power wire to +12VDC source on input board. 2. Connect BLACK ground wire to odd numbered terminal. 3. Connect GREEN signal wire to even numbered terminal. 4. Set input dip switch down. 
207-1000	Refrigerant Level Transducer (Hansen Probe)	**16AI**-Any Available Point **8IO**-Any Available Input Point	1. Wire BLACK ground wire from "GND" sensor terminal to odd numbered board terminal. 2. Wire GREEN signal wire from "SIGNAL" sensor terminal to even numbered board terminal. 3. Wire RED power wire from "POWER" sensor terminal to +12VDC terminal on board. 4. Set input dip switch down. 
203-1902	Dew Point Probe	**16AI**-Any Available Point **8IO**-Any Available Input Point **ARTC**-An Aux Input	1. Connect the WHITE and GREEN wires to AC1 and AC2 power terminals. 2. Connect BLACK ground wire to odd numbered board terminal. 3. Connect RED signal wire to even numbered board terminal. 4. Set input dip switch up. 

Table 5-1 *- Sensor Wiring*

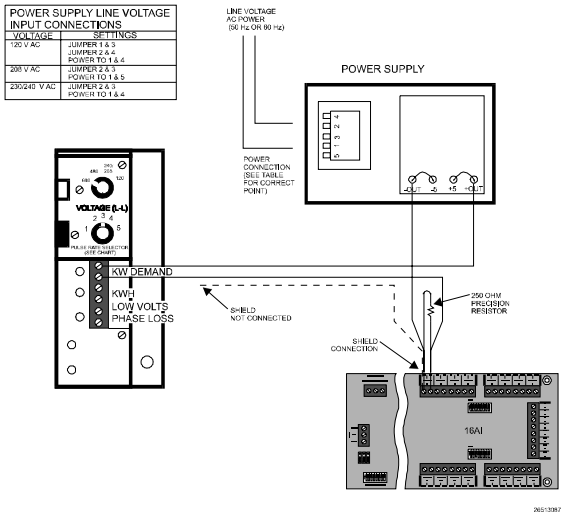
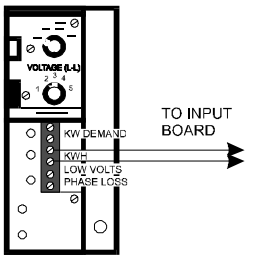
P/N	Sensor	Connect to Input Point by Board Type	Wiring
550-2500 550-2550	KW Transducer	**16AI (E.02 and Above)**-Any Available Point **16AIs Below v. E.02**-Pulse Accumulator Must be Connected to Point 1 **8IO**-Any Available Input Point **ARTC**-An Aux Input	**4-20 mA Output to Input Board**  1. Wire positive transducer terminal to positive 24VDC supply. 2. Wire negative transducer terminal to odd numbered input terminal. 3. Wire negative 24VDC supply to even numbered input terminal. 4. Place 250Ω resistor across odd and even numbered input terminals. 5. Set input dip switch down. **Pulse Accumulator Output to Input Board** 1. If the input board is an 8IO or a 16AI version E.02 or greater, connect the two KWH terminals to the input point (polarity insensitive) 2. If the input board is a 16AI version less than E.02, connect the KWH terminals to board point 1. Set input switch #1 DOWN, and set network switch #8 UP. 3. Set input dip switch down. 

Table 5-1 *- Sensor Wiring*

5.7. Power Connection Wiring

Power Requirements

Each board used with the RMCC has specific power requirements. These requirements determine how many boards may be wired to each transformer. Power requirements for each board on the RMCC network are listed in ***Table 5-2***.

	8IO	16AI	8RO
amps	.75	.25	.75
VA	18	5.0	15.0
VAC	24	24	24
Ground		Center-tapped	Center-tapped
	4AO	**485 Alm.**	**8DO**
amps	0.5		1.5
VA	10.0		18
VAC	24	120	24
Ground	Center-tapped		Center-tapped

Table 5-2 *- Power Requirements*

5.7.1. Power Transformers

Transformers for powering the input and output boards should be wired according to ***Figure 5-7*** and ***Figure 5-8*** depending on the number and type of boards being powered.

To select a power transformer for a board or a series of boards:

1. Determine what the total VA is for the boards that will be powered by the transformer.

   EX: Two 8IOs (18.0 VA each), and one 4AO (10.0 VA) boards are to be powered by one transformer

   $$(2 \times 18VA) + (1 \times 10VA) = 46VA$$

2. Use a transformer that has a power rating higher than the total calculated VA (see ***Figure 5-6***).

   EX: Three board transformer (56 VA) is sufficient

   56 VA is greater than 46 VA

	Three-Board	Six-Board	Ten-Board
P/N	640-0043	640-0045	640-0048
Power Rating	56 VA	100 VA	175 VA

Figure 5-6*-Power Ratings for CPC Transformers*

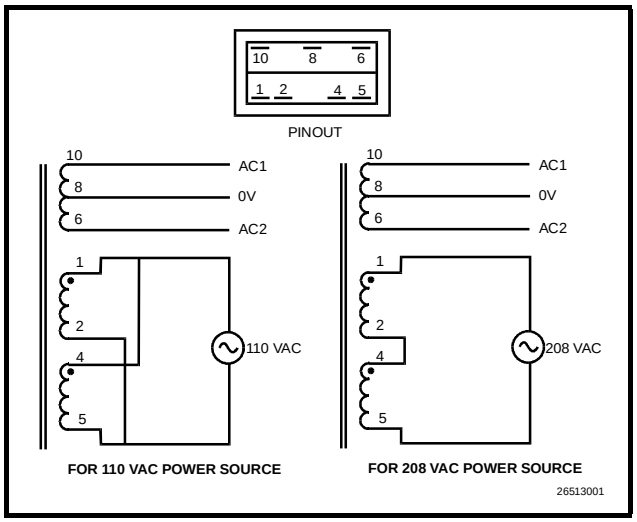


Figure 5-7 *- Wiring for 640-0043, Three Board, and 640-0045, Six Board Transformer*

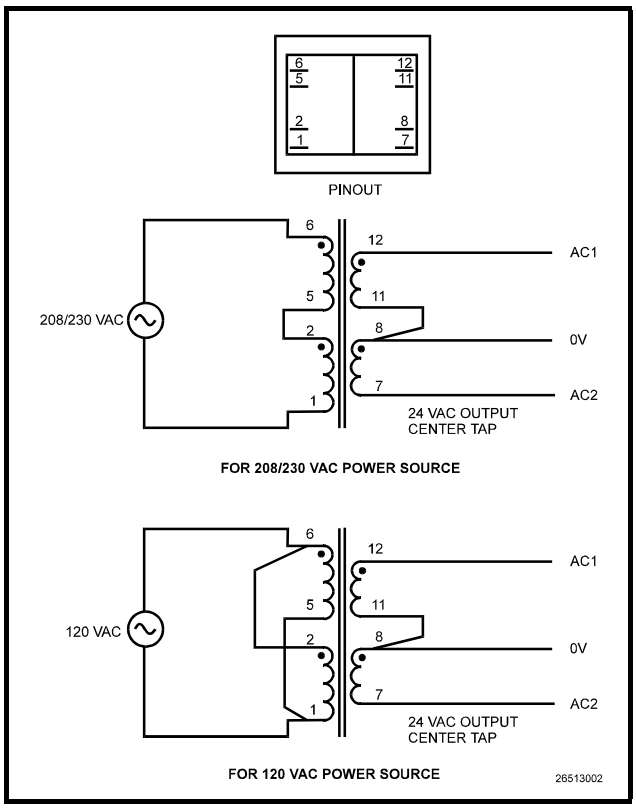


Figure 5-8 *- Wiring for 640-0048, Ten Board Transformer*

5.7.1.1. Wiring the 16AI, 8RO, 4AO, or 8DO

The 16AI, 8RO, 4AO, and 8DO all require the use of a center tap. The number of boards that need power will determine the transformer size that is required. (see **Section 5.7.1.,** *Power Transformers*). It is important that the transformer size match the board's power requirement.

Figure 5-9 diagrams the wiring for three 16AIs, 8ROs, 4AOs, or 8DOs, or any combination of the four board types. These boards all use a center tap configuration for grounding.

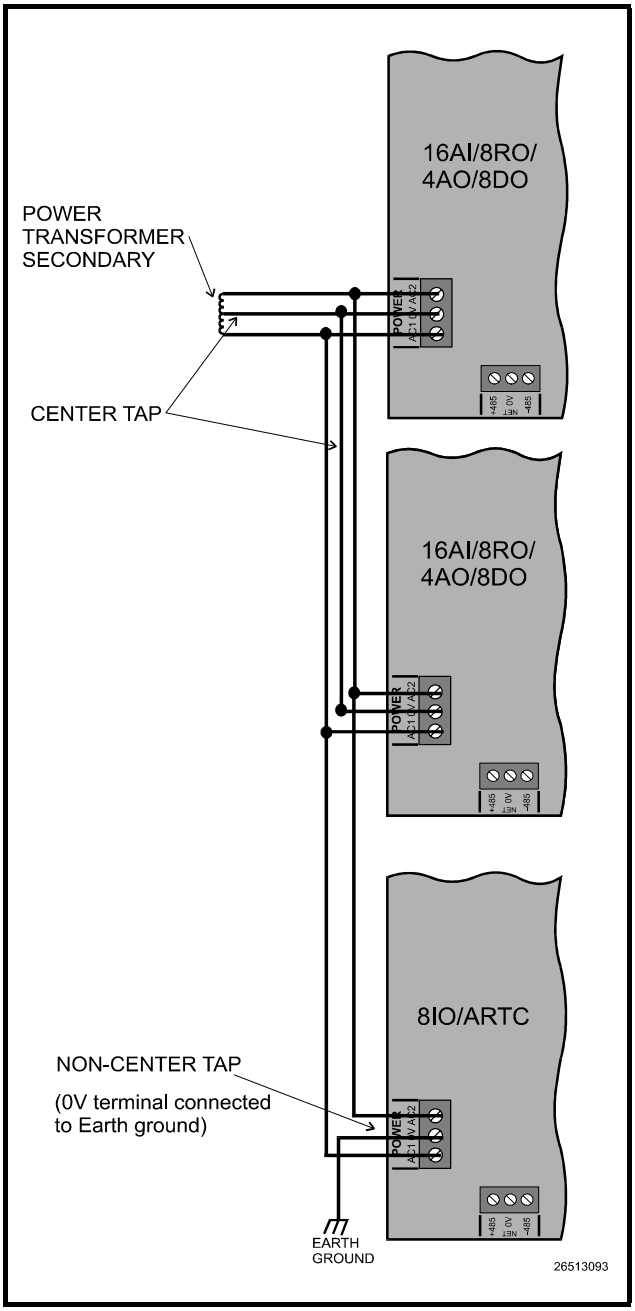


Figure 5-9*-Wiring for Three 16AIs, 8ROs, 4AOs, or 8DOs or Any Combination of*

5.7.1.2. Wiring the 8IO Board

The 8IO board can be wired for power in three different ways:

1. By itself with one transformer for power ***(Figure 5-10)***
2. In combination with a or multiple 16AI, 8RO, 4AO, or 8DO boards***(Figure 5-11)***
3. On a 24 V AC line with the ground in the sys-

tem on either side of the power line or with no ground in the system at all ***(Figure 5-12)***

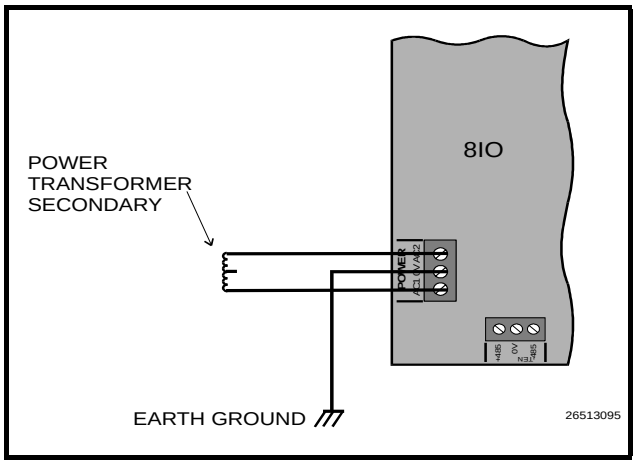


Figure 5-10*-Single 8IO Board Wired to One Transformer*

When the 8IO board is used by itself, it is satisfactory to wire the board with no grounding on either side of the 24 V AC power supply.

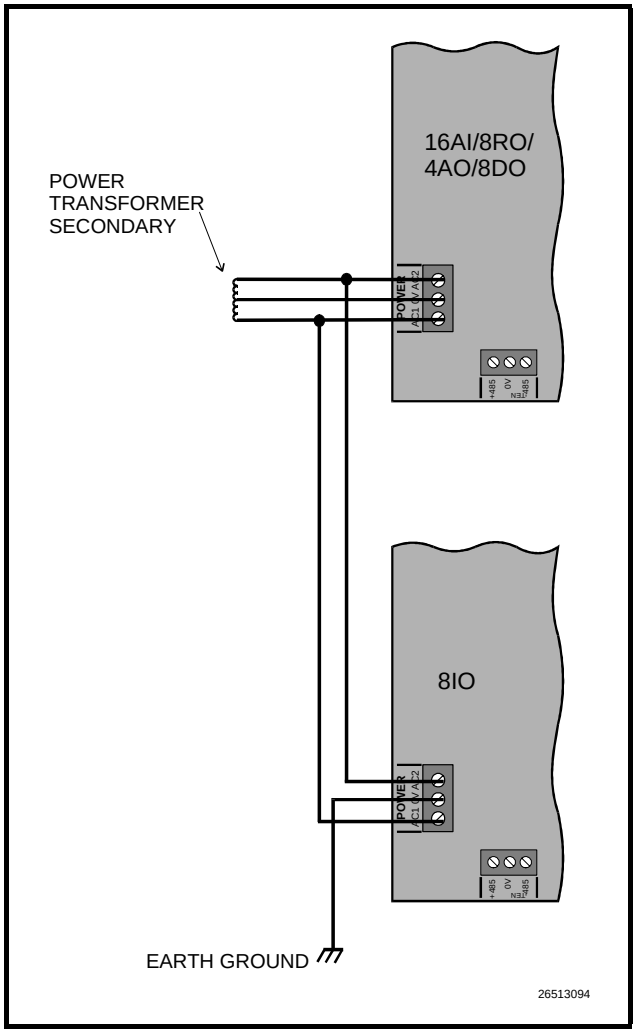


Figure 5-11*-8IO Board Wired in Combination with A or Multiple 16AI, 8RO, 4AO, 8DO*

When the 8IO board is wired in conjunction with other boards, the 8IO board is not grounded through the other board's center tap. A separate Earth ground should be run off of the 8IO.

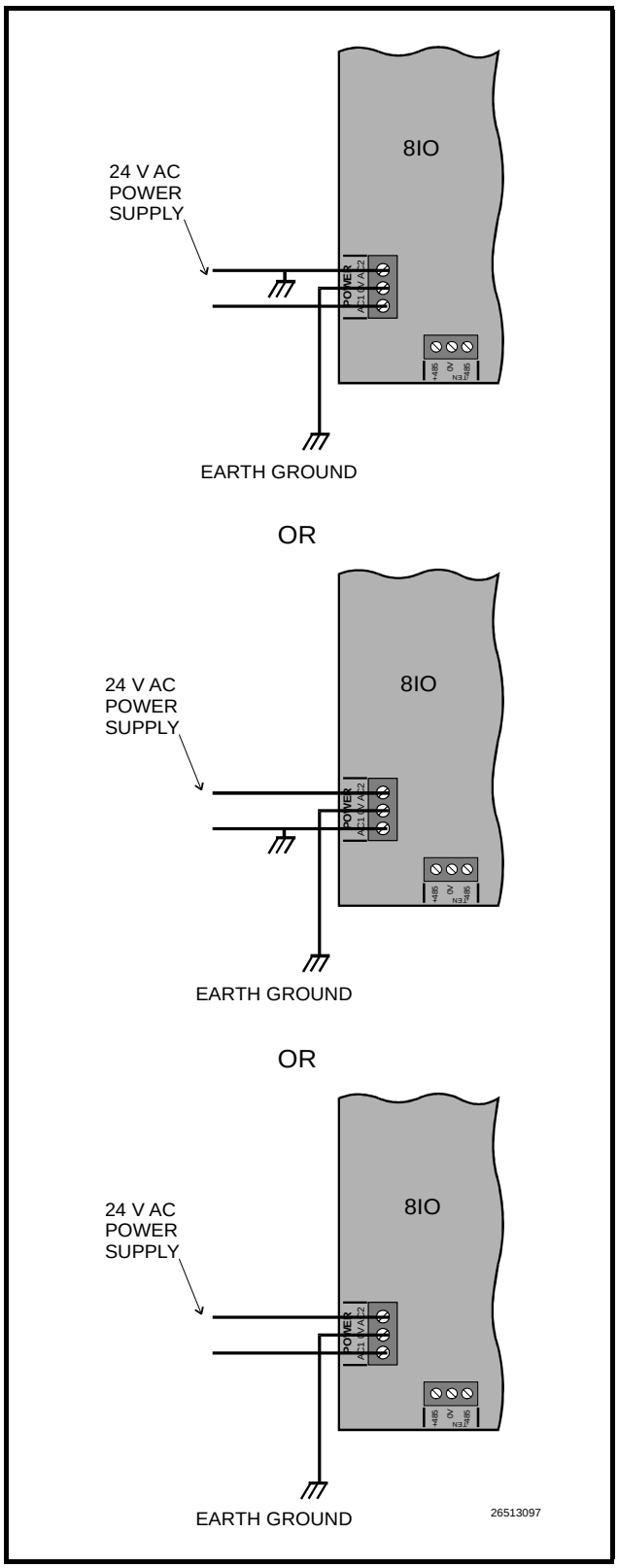


Figure 5-12*-One 8IO Wired to a 24 V AC Line with a Ground on Either Side*

When the 8IO is wired alone, either or neither side of the power supply may be grounded however, a separate Earth ground should be made off of the center terminal (power connection).

5.8. Network Settings

For all boards, except 8IO boards, the network dip switch labeled S1 (or S3 for the 16AI board) is used to set the unique board number of the unit and the baud rate. The 8IO uses rotary dials to set the board number of the unit and the baud rate is set internally at 9600.

5.8.1. Network Address

Board numbering is accomplished using the first five rockers on dip switch S3 on the 16AI board, the first five rockers on dip switch S1 on the 8RO and 8RO-FC boards, and two rotary dials on the 8IO board.

5.8.1.1. Dip Switches

Each of the first five rockers of either S1 or S3 is given a value which is twice as large as the value for the rocker to the left of it. The first rocker is given a value of one. With these five rockers, a board may be given any value between 1 and 31; however, network restrictions limit the actual number of boards that may reside on both the COM A and COM D networks at one time. These restrictions are given in **Section 4.7.,** *Number of Devices per Segment.* Use ***Figure 5-13*** to determine the switch settings for 16AI, 8RO, and 8RO-FC boards.

If a pulse type input is connected to a 16AI Board with software older than version E.02, it must be connected to input one and rocker number eight on the board's network dip switch must be configured ON or in the up position.

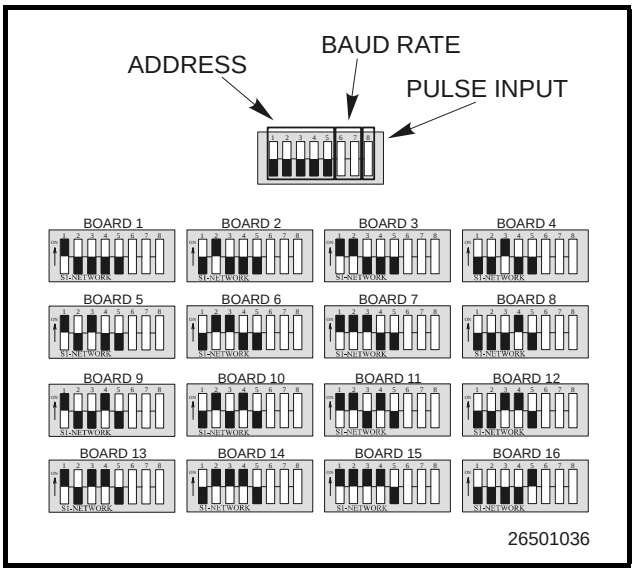


Figure 5-13 *- Network Address Settings for Dip Switch S1 or S3 on I/O Boards*

Rotary Dials on 8IO Board

The 8IO board uses rotary dials to set the network address in lieu of dip switches. The rotary dial S1 is used to define the output portion of the board. Therefore, the board may only be defined as board **one** through **nine** Likewise, dial S2 is used to define the input portion of the board and may be set from **one** to **nine**. Do not select the "0" on the dial.

5.8.1.2. LED Indicator Lights

Each board contains a LED Power Indicator Light. This light indicates if the board is receiving power. It also indicates if the board is on-line with the network by sending a pulsing signal.

5.9. Fail-Safe and Relay Dip Switch Settings

CPC uses two fail-safe devices on its output boards: a dip switch and jumpers. These two devices are used to provide fail-safe operation of equipment in the event of either power loss or network communication loss. The use of these devices differs depending on the board or controller.

Boards using Form C contacts do not have fail-safe devices, since the contacts are wired for the position required during power loss, but have a dip switch which illuminates the LED relay indicator depending on the contact position.

5.9.1. 8RO

The 8RO has both a fail-safe dip switch (S2) to force the contacts open or closed if the network fails, and a jumper for each output (JU4 through JU11) that forces the contact open or closed during a power loss. ***Figure 5-14*** shows the possible settings for the dip switch and jumpers.

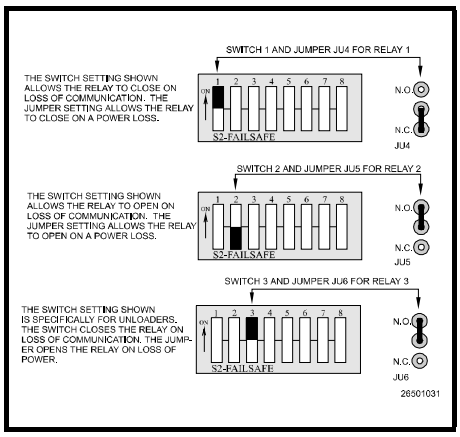

SWITCH 1 AND JUMPER JU4 FOR RELAY 1
THE SWITCH SETTING SHOWN ALLOWS THE RELAY TO CLOSE ON LOSS OF COMMUNICATION. THE JUMPER SETTING ALLOWS THE RELAY TO CLOSE ON A POWER LOSS.
ON
1 2 3 4 5 6 7 8
S2-FAILSAFE
N.O.
N.C.
JU4
SWITCH 2 AND JUMPER JU5 FOR RELAY 2
THE SWITCH SETTING SHOWN ALLOWS THE RELAY TO OPEN ON LOSS OF COMMUNICATION. THE JUMPER SETTING ALLOWS THE RELAY TO OPEN ON A POWER LOSS.
ON
1 2 3 4 5 6 7 8
S2-FAILSAFE
N.O.
N.C.
JU5
SWITCH 3 AND JUMPER JU6 FOR RELAY 3
THE SWITCH SETTING SHOWN IS SPECIFICALLY FOR UNLOADERS. THE SWITCH CLOSES THE RELAY ON LOSS OF COMMUNICATION. THE JUMPER OPENS THE RELAY ON LOSS OF POWER.
ON
1 2 3 4 5 6 7 8
S2-FAILSAFE
N.O.
N.C.
JU6
26501031

Figure 5-14 *- 8RO Board Fail-Safe Dip Switch and Jumper Settings*

5.9.2. 8IO and 8RO-FC

The 8IO and 8RO-FC have a dip switch (S2) which indicates the state of the relay (NC or NO). When the relay is set normally closed, the appropriate LED relay indicator (one through eight) is illuminated. Dip switch rockers one through eight should be set to the up position if the relay is wired normally closed and down if the relay is wired normally open.

5.10. Baud Rate Dip Switch Settings

The ARTC, 8IO, and 8RO-FC have a dip switch (S2) which indicates the state of the relay (NC or NO). When the relay is set normally closed, the appropriate LED relay indicator (one through eight) is illuminated. Dip switch rockers one through eight should be set to the up position if the relay is wired normally closed and down if the relay is wired normally open.

5.10.1. COM A and D Networks

The COM A and D networks may be set to either 4800, 9600, 19,200, or 38,400 baud. Positions one and two of the dip switch located on the processor board of the RMCC are used to set the baud rate. A different baud rate setting may not be set for the COM A and D networks.

Positions six and seven on dip switch S1 of the 4AO, 8RO, and 8RO-FC, and switch S3 of the 16AI, are used to set the baud rate for the communication boards. This baud rate should match the setting for the RMCC. ***Figure 5-15*** shows the possible baud rate settings and dip switch positions for the COM A and D networks.

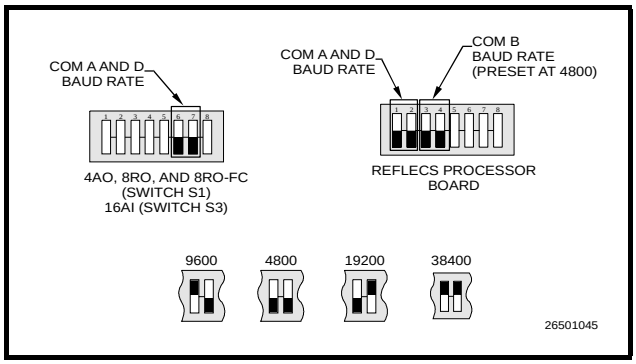


Figure 5-15 *- Baud Rate Dip Switch Settings*

5.10.1.1. Case Controllers

If using case controllers, the baud rate setting for COM A and D must be set to 19,200 since the baud rate for the case controller is hard-coded at 19,200. Refer to **Section 4.12.,** *Baud Rate Dip Switches (COM A and D only),* for more information.

5.10.1.2. 8IO Baud Rates

Baud rate settings for the 8IO board are automatically adjusted by the board based on the baud rate setting of the RMCC. The 8IO can communicate at baud rate settings between 4800 and 38,400.

5.10.2. COM B Network

The COM B baud rate is preset on the RMCC and 485 Alarm Panel dip switch S1 at 4800 since the 485 alarm panel can only communicate at 4800 baud.

5.10.3. COM C Network

The COM C baud rate setting is established within the remote communications screens in the RMCC and is related to the speed of the modem being used at the supermarket. The RMCC can communicate at 300, 1200, 2400, and 9600 baud. It is recommended that a baud rate of 9600 be used for remote communication.

5.11. Terminating Resistance Jumper Settings

Each device on the network has a set of three terminating resistance jumpers (JU1, JU2, JU3). These jumpers are critical to network operation. If a device is at the beginning or end of the COM A or COM D network, or if the device is at the hub of a star, the terminating resistance jumpers must be set to the up position. If the device is any where else on the network, set the jumpers down. Refer to **Section 4.10.,** *Terminating Resistance Jumpers (COM A, COM B, and COM D Only)* for more information.

5.12. Input Type Dip Switch Settings

The 16AI and 8IO Boards have input type dip switches that are used to establish the type of inputs connected to the board. On the 16AI, switches S2 and S1 contain all the rockers that correspond to each of the 16 inputs (shown in ***Figure 5-16***). On the 8IO, switch S4 contains eight rockers that represent inputs one through eight.

If a sensor requires voltage to operate, the input type dip switch rocker must be set to the DOWN position. Sensors that require no voltage must have their input type dip switch rockers set to the UP position.

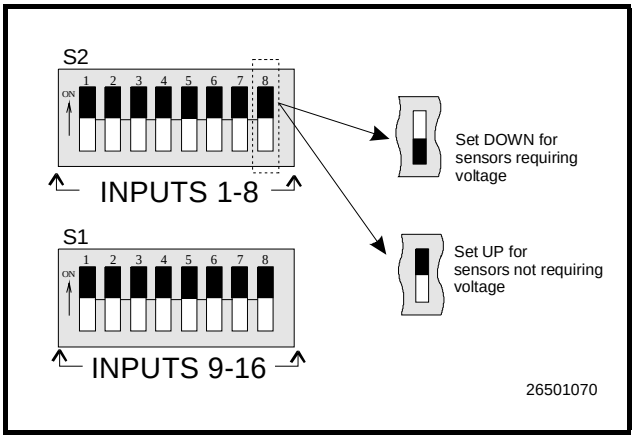


Figure 5-16 *- Input Type Switches (S1 and S2)*

6 Case Control Hardware Overview

This section provides complete information for installing and programming all versions of CPC's case controller. Information is also given for both the CCB and defrost power modules, which are designed to provide power within the space restrictions of the refrigerated case. The section should be used in conjunction with the other sections within this manual to configure a complete refrigeration control system. Information for controlling refrigerated cases without case controllers is provided in **Section 2,** *Hardware Overview*, and **Section 9,** *Software Overview*.

6.1. Introduction

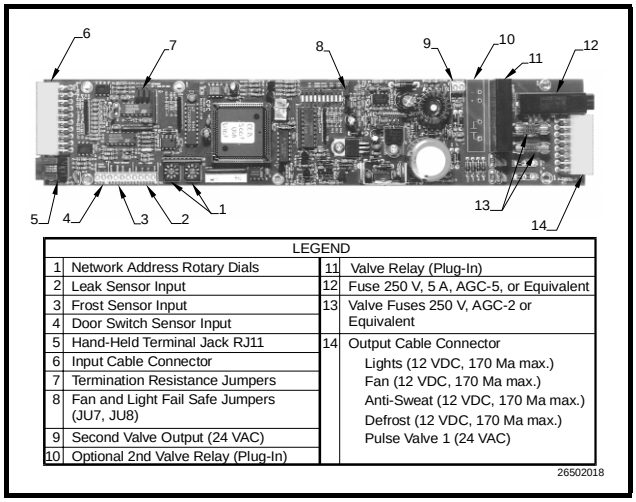
A case controller is typically designed to control all refrigerated case functions including lights, fans, defrost, anti-sweat, and suction side or liquid side valve control.

6.2. Hardware Description

6.2.1. Case Controllers

CPC produces two different hardware versions of the case controller to interact with either a pulse valve or stepper valve.

The pulse valve case controller ***(Figure 6-1)*** may be configured with a second valve relay for simultaneous control of two pulse valves. Control of two valves simultaneously is intended for applications where two evaporators are being used to refrigerate a single space such as a walk-in box cooler. A single pulse case controller is not capable of controlling two separate cases. The stepper valve case controller ***(Figure 6-2)*** does not have the second valve relay, and it has a jumper that is set based on whether the valve is bipolar or unipolar.



LEGEND			
1	Network Address Rotary Dials	11	Valve Relay (Plug-In)
2	Leak Sensor Input	12	Fuse 250 V, 5 A, AGC-5, or Equivalent
3	Frost Sensor Input	13	Valve Fuses 250 V, AGC-2 or Equivalent
4	Door Switch Sensor Input	14	Output Cable Connector
5	Hand-Held Terminal Jack RJ11		Lights (12 VDC, 170 Ma max.)
6	Input Cable Connector		Fan (12 VDC, 170 Ma max.)
7	Termination Resistance Jumpers		Anti-Sweat (12 VDC, 170 Ma max.)
8	Fan and Light Fail Safe Jumpers (JU7, JU8)		Defrost (12 VDC, 170 Ma max.)
9	Second Valve Output (24 VAC)		Pulse Valve 1 (24 VAC)
10	Optional 2nd Valve Relay (Plug-In)		

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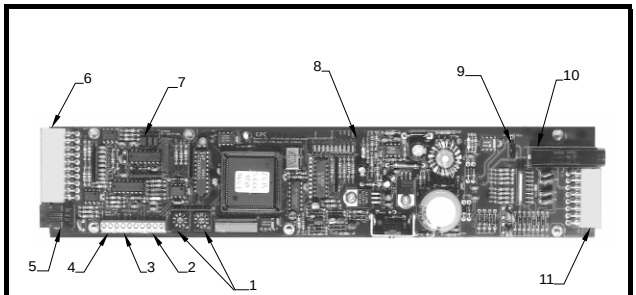
Figure 6-1 *- Pulse EEV Case Controller*



LEGEND			
1	Network Address Rotary Dials	10	Fuse 250 V, 5 A, AGC-5, or Equivalent
2	Leak Sensor Input	11	Output Cable Connector
3	Frost Sensor Input		Lights (12 VDC, 170 Ma max.)
4	Door Switch Sensor Input		Fan (12 VDC, 170 Ma max.)
5	Hand-Held Terminal Jack RJ11		Anti-Sweat (12 VDC, 170 Ma max.)
6	Input Cable Connector		Defrost (12 VDC, 170 Ma max.)
7	Termination Resistance Jumpers		Pulse Valve 1 (24 VAC)
8	Fan and Light Fail Safe Jumpers (JU7, JU8)		
9	Valve Type Jumper (JU5)		

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Figure 6-2 *- Stepper EEV Case Controller*

Full installation of the case control kit requires five standard components:

1. Case Controller
2. Applicable Temperature Sensors
3. Input Cable
4. Output Cable
5. Power Module

Items 1 and 2 are supplied as a single kit. The input and output cables must be ordered separately depending on the power modules being used.

Table 6-1 lists the different case controller types and their part numbers. ***Table 6-2*** lists the available input and output cable configurations and their part numbers.

Description	Part Number
Liquid Pulse EEV Case Controller Kit*	810-3140
Liquid Pulse EEV Case Controller (no sensors)	810-3141
Liquid Stepper EEV Case Controller Kit*	810-3150
Liquid Stepper EEV Case Controller (no sensors)	810-3151
Suction Stepper EEPR Case Controller Kit (Hussmann)**	810-3152
Suction Stepper EEPR Case Controller (Hussmann) (no sensors)	810-3153
Suction Stepper EEPR Case Controller Kit (CPC)**	810-3154
Suction Stepper EEPR Case Controller (CPC) (no sensors)	810-3155
Second Valve Kit (pulse only). Includes:	510-3130
Coil Inlet Temperature Sensor (Blue Leads)	501-1125
Coil Outlet Temperature Sensor (Red Leads)	501-1126
Solid State Relay	221-7000
75 VA Transformer	140-0050
Second Valve Kit, without 75 VA Transformer	510-3125
* Includes:	
Discharge Air Sensor (Green Leads)	501-1122
Coil Inlet Temperature Sensor (Blue Leads)	501-1125
Coil Outlet Temperature Sensor (Red Leads)	501-1126
** Includes:	
Discharge Air Sensor (Green Leads)	501-1122

Table 6-1 *- Case Controller Part Numbers*

6.2.2. Input and Output Cables

CPC produces a single input cable harness, and three different output cable harnesses depending on the power module or valve type being used.

The input cable harness (335-3151) is supplied with a connector for connection to the case controller, and connector ends which mate to the temperature sensors supplied with the case controllers.

The output cable harness may be any of three types. The full output cable harness is supplied without connectors (335-3156) for connection to non-CPC power modules, or with connectors (335-3158) for connection to CPC power modules, which are supplied with female connectors. A third output cable harness (335-3159) is provided if a Sporlan suction stepper unipolar valve is being used.

Table 6-2 lists the harness configurations and their part numbers.

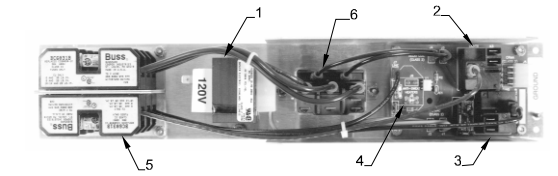
Description	Part Number
Input Cable - Includes coil in and coil out for one valve, discharge air, defrost termination, suction valve, and network I/O communication.	335-3151
Output Cable - Includes lights, fans, anti-sweat, defrost. For use with non-CPC power modules (without connectors).	335-3156
Output Cable - For use with CPC power modules (with connectors).	335-3158
Output Cable - For Sporlan SEI and CDS valves.	335-3159

Table 6-2*- Case Controller Cable Harness Part Numbers*

6.2.3. Power Modules

In addition to the case controllers, CPC manufactures a power module for distribution of incoming power to the controller and electric defrost circuits. The power module is available with or without circuit protection. See ***Figure 6-3*** and ***Figure 6-4***. The CPC power module configurations and part numbers are listed in ***Table 6-3***. The electrical ratings for the power modules are shown in ***Table 6-4***.

The case controllers may also be installed within the case in conjunction with an OEM-designed power module.



LEGEND			
1	Class 2, 24 VAC (50 VA) Transformer	4	Solid-State Relay (Anti-Sweat)
2	Mechanical Relay (Lights)	5	Class CC Fuses
3	Mechanical Relay (Fans)	6	Three-Pole Defrost Relay

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Figure 6-3 *- Case Controller Power Module*

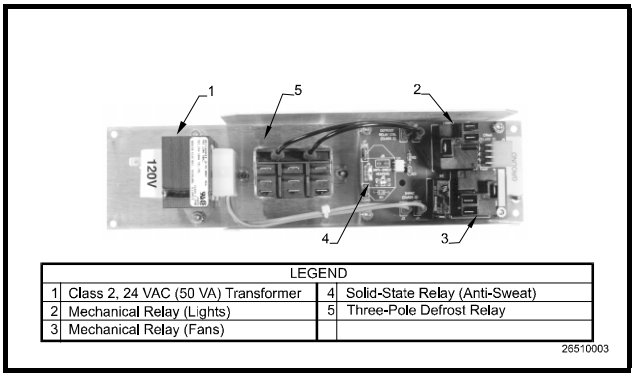

Figure 6-4 *- Case Controller Power Module Without Fuse Protection*

Description	Part Number	Lights	Fans	Anti-Sweat	Defrost
120 VAC 1 Phase/240 VAC 3 Phase Defrost, Full Configuration	816-3000	Yes	Yes		
	816-3005	Yes	Yes	Yes	
	816-3010	Yes	Yes	Yes	Yes
120 VAC 1 Phase/240 VAC 3 Phase Defrost, No Fuses, No Fuse Holder	816-3100	Yes	Yes		
	816-3105	Yes	Yes	Yes	
	816-3110	Yes	Yes	Yes	Yes
120 VAC 1 Phase/240 VAC 3 Phase Defrost, No Fuses, with Fuse Holder	816-3200	Yes	Yes		
	816-3205	Yes	Yes	Yes	
	816-3210	Yes	Yes	Yes	Yes
240 VAC 1 Phase, Full Configuration	816-3310	Yes	Yes	Yes	Yes

Table 6-3 *- Power Module Part Numbers*

Power Module Output Ratings				
Output	**Volts**	**Normally Open**	**Normally Closed**	**Maximum Fuse**
Lights	120 V	20 A	10 A	20 A
	240 V	6 A	3 A	
Fans	120 V	¾ hp	¼ hp	15 A
	240 V	1½ hp	½ hp	
Anti-Sweat	120 V	12 A		15 A
	240 V	12 A		
Defrost	120 V	30 A (1 or 2 pole) 25 A (3 pole)		30 A
	240 V	30 A (1 or 2 pole) 25 A (3 pole)		

Table 6-4 *- Power Module Output Ratings*

7 Case Control Installation

7.1. Case Controller

Generally, the case controller will be mounted within the raceway or on top of the case. If a controller must be replaced or installed in the field, it should be located based on the specific design of the case; however, the following guidelines are provided to help ensure proper installation..Use ***Table 7-1*** to help ensure that the correct CPC case control board is being installed.

Valve Type		Case Control Type	Probe Types Included	CPC Case Control Board Required
Manufacturer	**Valve Description**			
Generic	Pulse	Liquid Pulse	None	P/N 810-3141
			W/ Probes*	P/N 810-3140
			W/ High Humidity Probes	P/N 810-3142
	Second Valve Kit (Pulse Only)		W/ Coil Inlet Temperature Sensor, Coil Outlet Sensor, Solid State Relay, & 75 VA Transformer	P/N 510-3130
	Second Valve Kit (Pulse Only) W/out 75 VA Transformer		W/ Coil Inlet Temperature Sensor, Coil Outlet Sensor, Solid State Relay	P/N 510-3125
Alco	Stepper	Liquid Stepper ESV Valve	None	P/N 810-3151
			W/ Probes*	P/N 810-3150
		Hussman Suction Stepper ESR Valve	None	P/N 810-3157
			W/ Probes*	P/N 810-3156
		CPC (Standard) Suction ESR Valve	None	P/N 810-3159
			W/ Probes*	P/N 810-3158
Sporlan	Stepper	Hussman Suction Stepper CDS Valve	None	P/N 810-3153
			W/ Probes*	P/N 810-3152
		CPC (Standard) Suction CDS Valve	None	P/N 810-3155
			W/ Probes*	P/N 810-3154
		Liquid Stepper SEI valves	None	P/N 810-3139
			W/ Probes*	P/N 810-3138
*Includes Discharge Air Sensor, Coil Inlet Temperature Sensor, & Coil Outlet Temperature Sensor				

Table 7-1 *- Required CPC Case Control Boards based on Valve Type and Case Control Type*

7.1.1. Size

The case controller enclosure measures 14.375 inches long by 3 inches wide by 1.875 inches deep. The cover is secured to the base plate by two 6/32 lock nuts. The base has one 0.218 inch mounting hole located at each corner.

7.2. Power

Do not use the center tap of any transformer to power the CCB. Do not use a single transformer to power a CCB and another I/O board (16AI, 8RO, etc.).

The case controller should only be used with a Class 2, 24 VAC (50 VA) transformer with no center tap. Wiring of

the case controller to the transformer is diagrammed in ***Figure 7-1***.

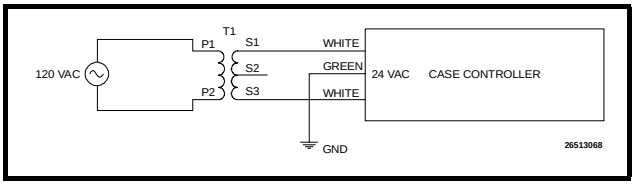

Figure 7-1 *- Case Controller to Transformer Wiring*

7.3. Jumper Settings

Valve Type Jumper (JU5) (Stepper EEV Only)

Set the valve type jumper (JU5) UP for 24V valves (Alco ESV & ESR Liquid Stepper) and DOWN for 12V valves (Sporlan SEI Liquid Stepper). See ***Table 7-2***

	ALCO ESV Liquid Stepper (S/EEV) Unipolar (24V)	Alco ESR Bipolar (24 V Only)	Sporlan SEI Liquid Stepper (S/EEV), CDS EEPR Bipolar (12V)
Set Jumpers For	Unipolar	Unipolar	Bipolar

Table 7-2 *- Valve Type Jumper Settings*

See **Section 8.3.,** *Valve Control*, for valve types available.

Lights and Fans Output Jumpers (JU7 and JU8)

If the lights and fans are wired to the NC connection of the power module relays, then the relays are de-rated to 10 amps.

Jumpers JU7 for lights and JU8 for fans define whether the relay is normally open or normally closed when 12 VDC power is applied. Set the jumpers up for normally open or down for normally closed. The case controller is supplied in the normally open configuration and should be wired to the case controller power module as shown in *Figure 5-13* and *Figure 5-14*. If JU7 and JU8 are set in the down position, wire the fans and lights to the NC connection on the power module relays. See ***Table 7-3***.

Jumper Position	Indicator Light	Output	Load
Up	On	12 VDC	On
Down	On	No voltage	On

Table 7-3 *- JU7 and JU8 setting result*

7.4. Baud Rate

The CCB baud rate is hard-coded at 19,200 and cannot be changed. For networks with case controllers attached, the baud rate setting for COM A and D on the RMCC should be set to 19,200. See **Section 4.12.,** *Baud Rate Dip Switches (COM A and D only)*.

7.5. Optional Inputs and Outputs

The case controller is configured with optional inputs for a leak detector, optical frost sensor, and clean/door switch (non-voltage contact change of state). One optional output for a second 24 VAC, pulse electronic expansion valve is provided. If a second valve is used, a valve relay must be installed as shown in ***Figure 6-1, Item 10***. Wiring for these connections is shown in ***Figure 7-2***.

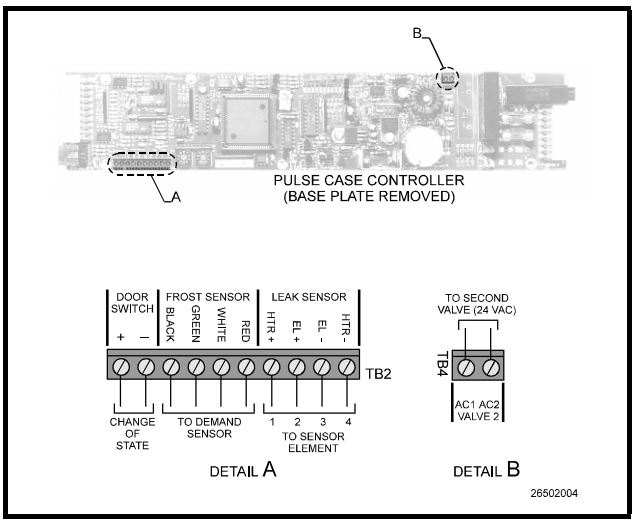

Figure 7-2 *- Case Controller Optional Inputs and Outputs Wiring*

7.6. Cable Harnesses

7.6.1. Input Cable

CPC's case controller input cable harness (335-3151) is designed for use with either a pulse or stepper valve case controller. The connector is constructed with 18 AWG color-coded wire with a male end, 20-pin connector for connection to the case controller. Female connectors are supplied for each of the sensors and wire leads are supplied for an optional suction valve and the RS485 network. The schematic diagram for the cable is shown in ***Figure 7-3***.

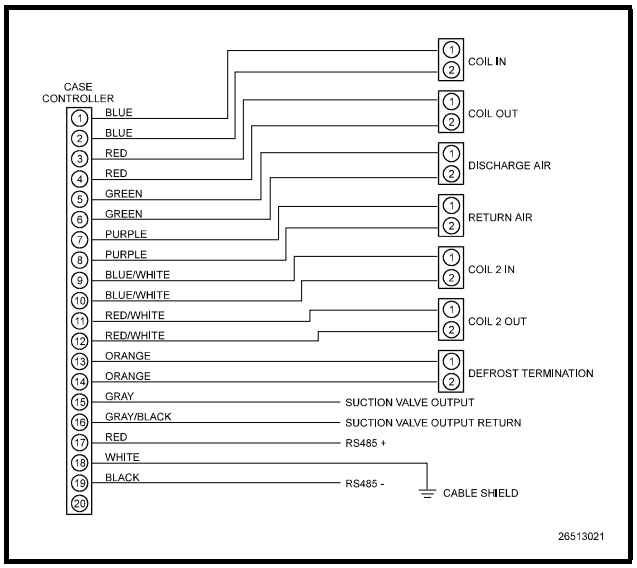

Figure 7-3 *- Input Cable Harness (335-3151) Schematic Diagram*

7.6.2. Output Cables

Full Output Cables

CPC's case controller full output cable harness without connectors (335-3156) and with connectors (335-3158) are designed for use with either a pulse or stepper valve case controller. The connector is constructed with 18 AWG color-coded wire with a 16-pin, male end connector for connection to the case controller. The 335-3156 output cable is supplied with wire leads for connection to non-CPC power modules, while the 335-3158 cable is supplied with an 8-pin, male end connector for connection to the CPC power module. The schematic diagrams for these cables are shown in ***Figure 7-4*** and ***Figure 7-5***.

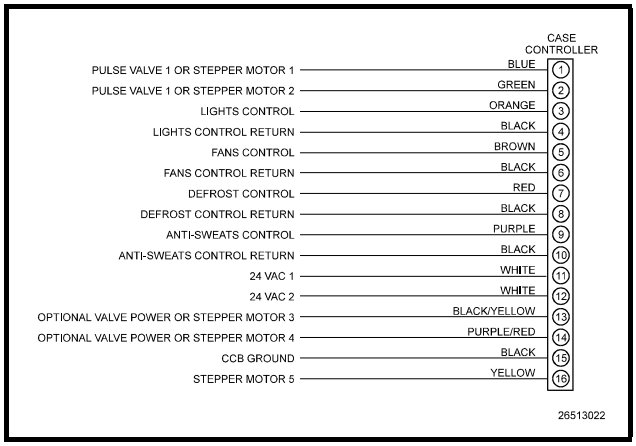

Figure 7-4 *- Output Cable Harness Without Quick Connects (335-3156) Schematic Diagram*

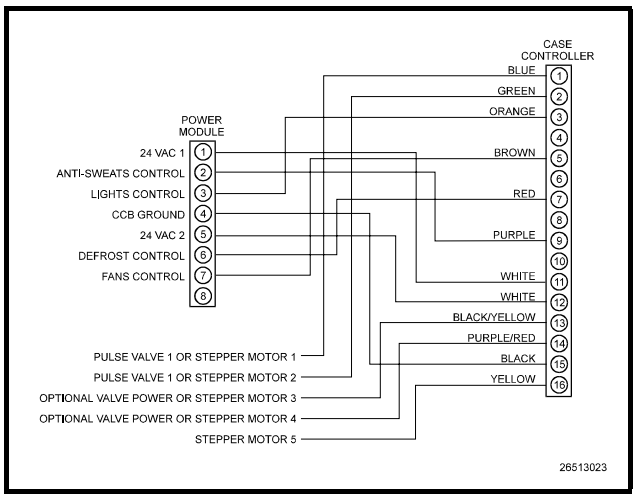

Figure 7-5 *- Output Cable Harness With Quick Connects (335-3158) Schematic Diagram*

Full Output Cable for Sporlan Suction Stepper Bipolar Valve

CPC's case controller full output cable harness (335-3159) is designed for use with a stepper valve case controller controlling a Sporlan suction stepper bipolar valve. The connector is constructed with 18 AWG color-coded wire with a 16-pin, male end connector for connection to the case controller, an 8-pin, male end connector for connection to a CPC power module, and a 4-pin female end connector for connection to the Sporlan valve.

The schematic diagram for this cable is shown in ***Figure 7-6***.

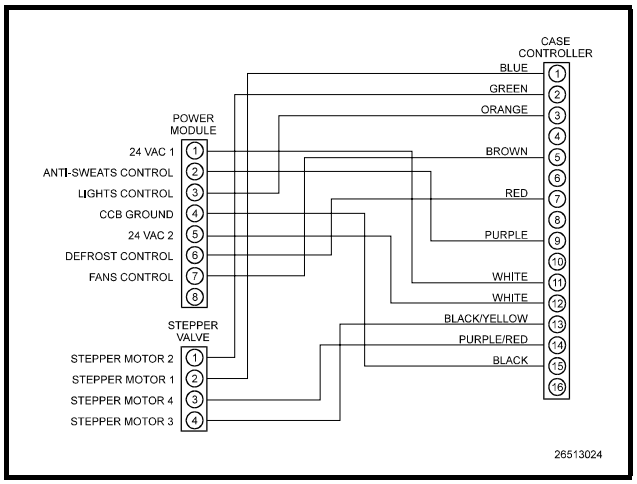

Figure 7-6 *- Sporlan Stepper Valve Output Cable Harness (335-3159) Schematic Diagram*

Full Output Cable for Alco ESR Valve

The CCB is designed to use the 24 V version of the Alco ESR Valve. The 24 V version of the valve has -24VDC appended to the part number. The ESR valve harness from Alco comes in two versions, with an in-line molex connector, the CPC harness (P/N 335-3159) can be used. If the valve is purchased with the in-line molex, the CPC Output Cable Harness with Quick Connects (335-3158) must be used. The connector must be cut off of the harness and the valve wired according to specifications in ***Table 7-4***.

Table 7-4 shows the relationship between the CPC output cable colors and the associated valve cable colors.

CPC Wire Color	Pin #	ALCO ESV Liquid Stepper (S/EEV) Unipolar (24V)	Alco ESR Bipolar (24 V Only)	Sporlan SEI Liquid Stepper (S/EEV), CDS EEPR Bipolar (12V)
Blue	1	Blue	Red	Red
Green	2	Red	Blue	Green
Black/ Yellow	13	Black	Black	Black
Purple/ Red	14	White	White	White
Yellow	16	Yellow	Not Used	Not Used

Table 7-4 *- Valve Cable Wire Colors*

7.7. Power Modules

Size

The case controller power module measures 16.25 inches long by 3 inches wide by approximately 3.25 inches deep. The base plate has one 0.218 inch mounting hole located at each corner.

Power

The case controller power module should be connected to a 120 VAC single phase power source. Complete wiring of the case controller power module is diagrammed in ***Figure 7-7***. Follow all local, NEC, and UL wiring practices

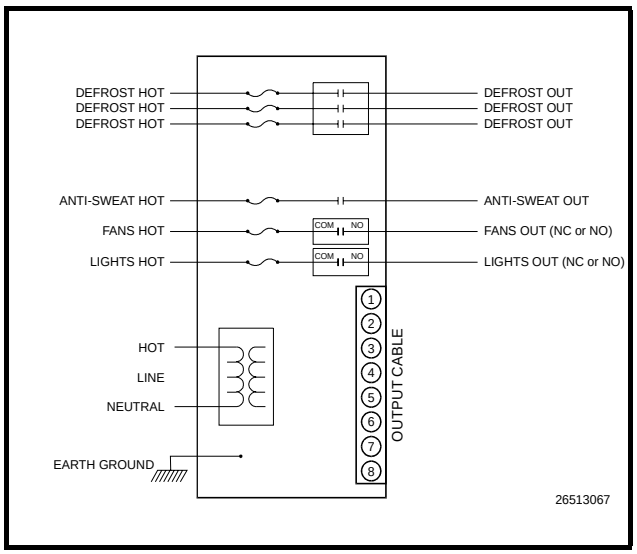

Figure 7-7 *- Case Controller and Defrost Power Module Wiring Schematic*

7.8. Sensor Location

7.8.1. Discharge Air Sensor (Green Leads)

In general, the discharge air sensor should be located in the air stream leaving the evaporator coil, but just before the air stream enters the food compartment of the refrigerated display case.

7.8.2. Coil Inlet Sensor (Blue Leads)

Proper location of the coil inlet sensor is critical since valve control is dependent upon accurate measurement of changes to evaporator liquid temperature. The coil inlet sensor should be located on either the first or second pass through the evaporator. Preferably, the sensor should be placed six inches into the evaporator on the first pass.

Place the coil inlet sensor with the curved surface against the pipe and secure with a Panduit low-temperature cable tie number PLT2S-M120 or equivalent. The tie should be positioned in the groove on the top surface of the sensor. A second tie should be used to secure the lead to the pipe for additional support.

Sensors located on refrigerant tubing should be insulated to eliminate the influence of the surrounding air. A self-adhering insulation that will not absorb moisture is recommended to prevent ice accumulating at the sensor location. For orientation of the sensor on the coil, see ***Figure 7-8***.

7.8.3. Coil Outlet Sensor (Red Leads)

Proper location of the coil outlet sensor is critical since valve control is dependent upon accurate measurement of changes to evaporator discharge gas temperature. The coil outlet sensor should be located on a horizontal section of the suction line, near the evaporator outlet. Follow the mounting instructions listed for the coil inlet sensor. For orientation of the sensor on the coil, see ***Figure 7-8***.

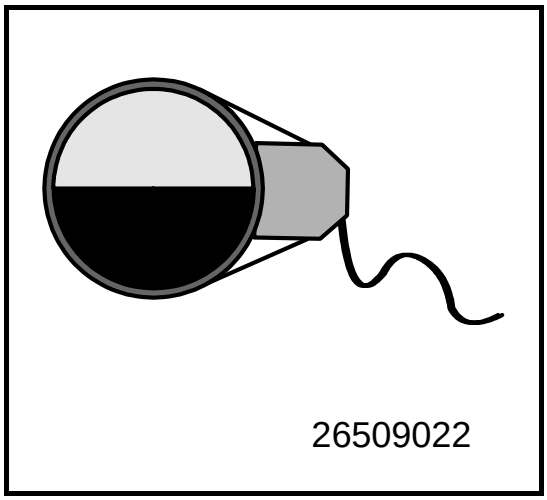

Figure 7-8*- Sensor Location*

7.9. Wiring

Complete wiring of the Case Controller, Case Controller Power Module, and optional Defrost Power Module is shown in **Appendix E: Wiring for Case Controller, Power Module, Defrost Module, and Pulse EEV Valve** and **Appendix F: Wiring for Case Controller, Power Module, Defrost Module, and Sporlan EEPR Valve**.

8 Case Control Software Overview

CPC's case controller supports both liquid-side pulse and stepper valves, and suction-side stepper valves.

The fundamental control algorithms and their associated set points may be segregated into the following parts:

1. Superheat control - control of the temperature differential of the coil (only applicable to liquid side control). The CCB is capable of supporting two pulse valves independently.
2. Temperature control - regulation of the temperature in the controlled space by monitoring either discharge or return air. This may be either liquid side or suction side control.
3. Pulse and stepper valve control.
4. Defrost operation including pump-down, drip, and wait.
5. Defrost recovery and system start-up.
6. Anti-sweat control.
7. Fan control.
8. Light control.
9. Wash mode.

The following sections describe each of the control components and their associated set points.

8.1. Superheat Control (Liquid Side Control Only)

The case controller determines the valve percentage opening by monitoring the temperature differential between the coil inlet and outlet sensors and comparing that value to the superheat set point. The set points necessary for superheat control are shown in ***Table 8-1***. Refrigerant control may be accomplished using either a pulse type valve using pulse width modulation or a stepper valve.

The superheat control algorithm is identical for either valve type. Once a valve percentage has been determined, this value is fed to the valve output algorithm. The valve output algorithm converts the valve percentage into the appropriate control value depending on the valve type being used. For a pulse valve, the control value is a duration the valve will be fully open within a fixed period of time. For a stepper valve, the valve is the number of steps the valve opening must be adjusted to move from the current opening to the new required opening. Control of the coil's superheat applies to liquid side valve control only.

Name	Type	Default Value	Min/Max	Description
Coil In	Input	NA	-50.0°F - 120°F	Current coil inlet temperature.
Coil Out	Input	NA	-50.0°F - 120°F	Current coil outlet temperature.
Desired Superheat	Set point	9°F	1°F - 15°F	Target coil differential.
Valve Multiplier	Set point	100%	10% - 100%	Multiplier applied to output %. Used to support overcapacity valves.
Sensitivity	Set point	4	0 - 9, 16 - 255	Sets throttling range and integral gain.
Valve %	Output	NA	0% - 100%	Calculated valve % required to reach/maintain set point.

Table 8-1 *- Superheat Control Parameters*

8.2. Temperature Control

Liquid Side Control

The case controller controls case temperature from the liquid side of the evaporator through simple thermostatic control of refrigerant supply to the coil. If the case temperature is satisfied, no refrigerant is allowed to flow. If the case temperature is too high, refrigerant is allowed to flow, and is then regulated by the superheat control algorithm.

The method of determining case temperature is selected as a set point, and may be supplied by a single sensor or a combination of the return air and discharge air sensors using the "Mix% Dsch" set point shown in ***Table 8-2***.

Liquid side control uses superheat control (discussed earlier) while refrigerant is being supplied. If the case temperature is greater than the desired set point + ½ dead band the coil control algorithm is invoked and refrigerant is allowed to flow. The refrigerant flow will be stopped when the case temperature is less than the desired set point - ½ dead band.

Valve Filter

At times, the EEV may react too quickly to the control commands supplied by the CCB. To compensate, the CCB may be programmed with a valve filter value. The change

in valve opening or closing called for by the RMCC during each six-second control loop is automatically multiplied by the valve filter percentage, resulting in a smaller adjustment to the EEV.

For example, if the RMCC ordered an EEV to open from 50% to 60%, an EEV with a valve filter rating of 100 would open to 60% at the end of the six-second control loop. An EEV with a filter rating of 50, however, would open only half of that distance at the end of the control loop—from 50% to 55%. Similarly, an EEV with a valve filter value of 25 would open to 52.5%.

Name	Type	Default Value	Min/Max	Description
Case Temp	Input	NA	-20°F - 120°F	Temp sensor reading.
Case Temp From	Set point	Disch Air	NA	Method of calculating case temperature (disch Air, return air, mixed).
Mix% Dsch	Set point	50%	0% - 100%	The weight given to the discharge air if “mixed” is selected.
Circuit Case Temp	Set point	20°F	-40°F - 70°F	Case temperature set point.
Dead band	Set point	0.6°F	0.1°F - 10.0°F	Dead band around case temp set point.
Case Offset	Set point	20°F	-99°F - 99°F	Varies a single case temp from the circuit case temp set point.
Close Rate	Set point	0	10 - 255	Determines how fast the valve will close when the case temperature set point is reached.
Valve Filter	Set Point	100%	0% - 100%	Reduces the valve opening value supplied by the PID algorithm.

***Table 8-2** - Liquid Side Temperature Control Parameters*

Suction Side Control

The case controller controls case temperature from the suction side of the evaporator by controlling the valve opening percentage of the suction valve to regulate the suction pressure. In suction side control, superheat is not being controlled. The case temperature is being monitored, and the suction valve percentage is controlled via a suction algorithm to maintain the set point. The suction side parameters are shown in ***Table 8-3***.

Name	Type	Default Value	Min/Max	Description
Case Temperature	Input	NA	-20.0°F - 120.0°F	Average of installed discharge air temp sensors.
Valve%	Output	NA	1% - 100%	Calculated % from suction algorithm.
Case Temp Combination Type	Set point			Determines how case temperature reading of installed sensors will be combined (avg, max, min).
Update Rate	Set Point	6 seconds	1 second - 60 seconds	Determines how often the algorithm will update the valve position.

***Table 8-3** - Suction Side Temperature Control Parameters*

8.3. Valve Control

The CCB is capable of supporting two types of valves: pulse and stepper. A pulse valve controls flow by pulsing fully open and fully closed within a fixed period of six seconds. A stepper valve controls flow by adjusting the valve opening from zero to 100 percent using a fixed number of steps.

Both valve types are controlled using PID control. PID control is explained in-depth in **Section 3.1., *PID Control***. However, programming the PID parameters for case control is slightly different than programming for other systems. In case control, throttling range (TR) and a multiplier called **integral gain** (K_i) are both set by specifying a single value called **sensitivity**.

Sensitivity determines the size of the PID output’s reaction to changes in the input. Sensitivity is set by entering a value from 0 to 9. Zero is the lowest sensitivity and thus will have a lesser reaction to error; nine is the highest sensitivity.

The sensitivity levels specified correspond to preset values of the throttling range and the integral gain, as

shown in ***Table 8-4*** and ***Table 8-5***. Throttling range determines the range of inputs that will result in a 0-100% proportional reaction; therefore, the higher the sensitivity rating, the lower the throttling range. The integral gain is simply a multiplier that adjusts the size of the integral part of PID; therefore, greater integral gains result in higher sensitivity.

Sensitivity	TR	K_i
0	12°F	0.5
1	10°F	0.5
2	10°F	1.0
3	8°F	0.5
4	8°F	1.0
5	8°F	2.0
6	6°F	1.0
7	6°F	2.0
8	4°F	1.0
9	4°F	2.0

Table 8-4 *- Relationship of Sensitivity to Throttling Range (TR) and Integral Gain (K_i) for Suction Side Control*

Sensitivity	TR	K_i
0	20°F	1.0
1	16°F	0.5
2	16°F	1.0
3	12°F	0.5
4	12°F	1.0
5	12°F	2.0
6	10°F	1.0
7	10°F	2.0
8	8°F	1.0
9	8°F	2.0

Table 8-5 *- Relationship of Sensitivity to Throttling Range (TR) and Integral Gain (K_i) for Liquid Side Control*

Throttling ranges and integral gains not shown in the tables may also be used. To determine the sensitivity number for a custom combination, use the following formula:

$$\text{Sensitivity} = 16 \times (TR/2) + (5 \times K_i)$$

Sensitivity calculated with this formula will not correspond with the sensitivities listed in ***Table 8-4*** and ***Table 8-5***. The formula listed above is used to calculate custom sensitivities only.

Pulse Valve Control

Pulse valve control is used by the liquid algorithm to control superheat. The coil control algorithm calculates an output percentage and passes this value to the valve control algorithm. The valve control algorithm pulses the valve on and off. The period used to pulse the valve is fixed at six seconds.

When case temperature is satisfied, the valve control algorithm uses a close rate set point to determine the speed at which the valve transitions to the closed position. The algorithm closes the valve at a rate of 1/10th the close rate set point every six seconds until the fully closed position is reached. The valve control algorithm also has a rapid close rate function that multiplies the close rate set point by four if the case temperature is two degrees cooler than the case temperature set point.

Stepper Valve Control

Stepper valve control is used by the liquid and suction algorithms. Basically, in stepper valve control, the valve is positioned at the % open as determined by the control algorithm. The control algorithm (liquid stepper or suction) determines the output % and passes this to the stepper valve control algorithm. The valve control algorithm controls the valve according to set points that define the number of steps for full travel, the maximum rate, and hysteresis.

Valve Types

The CCB is capable of controlling two types of valves: bipolar and unipolar. Representative characteristics for both valve types are shown below:

Sporlan EEPR or EEV (bipolar)

- Full Travel: 2500 steps
- Maximum Step Rate: 100 steps/second
- Hysteresis: 10 steps
- Valve Type: 2 phase PM 2 coil bipolar

Alco EEV (unipolar)

- Full Travel: 384 steps
- Maximum Step Rate: 33 steps/second
- Hysteresis: 0 steps
- Valve Type: 4 phase unipolar

Alco ESR-12 (bipolar)

- Full Travel: 500 steps
- Maximum Step Rate: 50 steps/second
- Hysteresis: 0 steps
- Valve Type: 2 phase PM 2 coil bipolar

Alco ESR-20 (bipolar)

- Full Travel: 800 steps
- Maximum Step Rate: 50 steps/second
- Hysteresis: 0 steps
- Valve Type: 2 phase PM 2 coil bipolar

Name	Type	Default	Min/Max	Description
Max Step Rate	Set point	0 steps/sec	1 - 100	The maximum number of steps per second the valve will support.
Hysteresis	Set point	0 steps	0 - 100	Number of steps required for valve to change direction.
Full Travel	Set Point	0 steps	0 - 6553	Number of step at which the valve is open 100%.

Table 8-6 *- Stepper Valve Parameters*

8.4. Defrost Control

There are three types of defrost supported by the case controller: hot gas, electric off cycle (also called timed), and reverse air. For hot gas, a suction valve must be wired to the optional suction valve terminal of the case controller. See ***Figure 7-2*** in **Section 7.5.,** *Optional Inputs and Outputs*. This suction valve closes during hot gas defrost. The state of the outputs during defrost is shown below in ***Table 8-7***.

State	Expansion Valve	Suction Valve	Defrost Output
Normal	NORMAL	ON	OFF
Start Defrost (pump down)	OFF	ON	OFF
Defrost	OFF	OFF	ON
Drip	OFF	OFF	OFF
Wait	OFF	OFF	OFF
Recovery	NORMAL	ON	OFF

Table 8-7 *- Output State During Defrost*

The fan may be configured to be ON or OFF during defrost.

Termination of the defrost may be via

1. termination temperature reached,
2. defrost termination input, or
3. expiration of the defrost time.

If an input is configured as a demand defrost input, the CCB will check the demand defrost state before entering the defrost state. If no demand defrost is present, the CCB will not enter the defrost state unless overridden by an emergency defrost command.

Defrost control is configured through the RMCC. Refer to **Section 7*, System Navigation***.

8.5. System Start-Up

When the CCB is powered-up, either for the first time or after a power failure, it sits idle for a period of 72 seconds before beginning case control. During this time, the CCB waits for communication with an RMCC to begin. If communication with the RMCC is begun, the CCB starts normal case control at that time. If, after 72 seconds, no communication is established with the RMCC, the CCB assumes that no RMCC is available and begins control on its own. If the CCB is controlling a stepper valve, the valve is fully closed during start-up to ensure that the position of the valve is known when normal control is reestablished. After start-up, recovery is initiated.

8.6. System Recovery Mode.

The CCB may exit recovery mode early and begin normal superheat control if, after 24 seconds, superheat is greater than 150 percent of the superheat set point.

Recovery occurs when the valve has been fully closed because either the temperature set point was satisfied or because of defrost or system start-up. A recovery sequence is necessary since, in both of these instances, the coil is empty. To refill the coil and reestablish superheat, the valve is opened a certain percentage for a fixed period of time. After the recovery period is complete, normal superheat control algorithms are used. ***Table 8-8*** describes how the recovery time is determined.

Name	Type	Default	Min/Max	Description
Maximum Recovery time	Set point	0 seconds	30 - 255 seconds	Maximum amount of time valve will be left open to establish superheat.
Recovery %	Set point	7 (70%)	0 - 10 (0% - 100%)	Amount to open valve during recovery.

Table 8-8 *- Recovery Parameters*

Anti-Sweat Control

The anti-sweat algorithm controls the pulsing of the anti-sweat output to control the heat applied to the heaters. ***Table 8-9*** lists the set points used to control the anti-sweat algorithm. The anti-sweat control algorithm compares a value sent by the RMCC to the high and low anti-sweat set points. Based on that reading, the algorithm pulses the heaters ON for some fraction of six seconds depending on where the humidity reading falls within the anti-sweat set point range. See **Section 3.5.,** ***Anti-Sweat Control***, for a complete explanation of the anti-sweat algorithm.

The value sent by the RMCC may be from either a dew point probe or a relative humidity sensor. The anti-sweat algorithm does not differentiate between the two types, it only reads the raw value and compares it to the high and low anti-sweat set points.

Name	Type	Default	Min/ Max	Description
Period	Fixed	6 seconds	None	Number of seconds the anti-sweat algorithm divides between time on and time off.
High anti-sweat set point	Set point	60%	0% - 100%	Humidity level when heaters will be on 100% of six seconds.
Low anti-sweat set point	Set point	40%	0% - 100%	Humidity level when heaters will be on 10% of six seconds.

Table 8-9 *- Anti-Sweat Control Parameters*

8.7. Fan Control

The fan control algorithm controls operation of the fan output. The fans will be on while in normal operation (liquid control or suction control). When in defrost mode, the fan status may be programmed to be either ON or OFF. If the fan status is programmed OFF during defrost, a coil out delay may be specified that forces the fan to continue to run until the coil outlet temperature exceeds the delay set point. See **Section 8.4.,** *Defrost Control*, for more information. For walk in box control, the fan will turn off when the door switch is activated.

8.8. Light Control

The case controller controls the light output as shown below. The light control set point is shown in ***Table 8-10***.

1. The lights default to on.
2. For walk-in box control, when the door switch input is activated (door open) the lights will turn on. The lights turn off when the switch is deactivated.

Name	Type	Default	Description
Light Active Level	Set point	Active hi	Defines the active (on) level for the lights (active hi or active lo).

Table 8-10 *- Light Level Parameters*

8.9. Wash Mode

Wash mode is initiated by activation of the cleaning switch or through the hand-held terminal. During wash mode, refrigerant flow is stopped, the fan and anti-sweat outputs are turned off, and the lights are turned on. Wash mode may end by either a time-out condition, or by the cleaning switch.

When a time-out condition is detected, the case controller automatically ends wash mode and enters recovery mode.

If manual deactivation of the cleaning switch is detected, the CCB will end wash mode and enter recovery mode. The wash mode set points are shown in ***Table 8-11***.

It is possible to define a cleaning switch input at both a 16AI and the case controller. When this is done, the 16AI takes priority over the case controller cleaning switch inputs. That is, when a circuit is in clean mode because of a contact closure at the 16AI input, a single case cannot be brought out of clean mode through the cleaning switch connected to the case controller. However, if a contact closure is not received from the 16AI, a single case may be put into wash mode using the local cleaning switch.

Name	Type	Default	Min/ Max	Description
Cleaning Switch	Input	NA	NA	Contact closure.
Wash Deactivate Type	Set point		NA	Timed or manual deactivate.
Wash Time	Set point		0/120 minutes	Time to stay in wash mode (Time deactivate only).

Table 8-11 *- Wash Mode Parameters*

8.10. Fail-Safe Mode (Liquid Side Control Only)

Under the following conditions, the CCB will enter fail-safe mode:

1. Corruption detected in case and circuit set points. The CCB will revert to the default settings as described in the tables within this section.
2. Unrecoverable sensor failure(s). The CCB will calculate a sensor value or use a default setting as described below.

8.10.1. Evaporator Control During Temperature Sensor Failure

During a temperature sensor failure, the case controller must compensate for the lost data by either performing a calculation to define an alternate value or using data already defined at an alternate source. The case controller is designed to compensate for several sensor failures: coil inlet, coil outlet, both coil inlet and outlet, and discharge air.

Coil Inlet Sensor Failure

If the coil inlet reads open or short, or if the coil inlet temperature reading is 20°F above the control set point for 10 minutes, the case controller will go into sensor bypass. During sensor bypass, the case controller calculates the coil inlet temperature as follows:

Coil Inlet = Coil Outlet - Control Set Point + 12
Example:
Case Set Point = 20
Coil Inlet = Open or Short (bypass)
Coil Outlet = 15
15 - 20 + 12 = 7 (calculated inlet temperature)

Coil Outlet Sensor Failure

If the coil outlet reads open or short, or if the coil outlet temperature reading is 35°F above the control set point for 60 minutes, the case controller will go into sensor bypass. During sensor bypass, the case controller controls the valve using the Default Valve Percentage defined under CCB Set Points in the RMCC System Navigation.

Coil Inlet and Coil Outlet Sensor Failure

If both the coil inlet and coil outlet read open or short the case controller will go into sensor bypass. During sensor bypass, the case controller controls the valve using the Default Valve Percentage defined under Case Set Points in the RMCC, page 51.

Discharge Air Sensor Failure (Liquid)

If the discharge air sensor reads open or short, or if the discharge air temperature reading is 15°F above the control set point for 15 minutes (when not in defrost), the case controller initiates recovery mode (see **Section 8.6.,** *System Recovery Mode.*). After the recovery sequence is complete, the case controller will return to normal control. The case controller will wait another 15 minutes before repeating the recovery sequence again.

Discharge Air Sensor Failure (CPC Suction)

If the discharge air sensor reads open or short, the RMCC writes a case fail alarm to the Alarm log.

Discharge Air Sensor Failure (Hussmann Suction)

If the discharge air sensor reads open or short, or if the discharge air temperature reading is 15°F above the control set point for 15 minutes (when not in defrost), the case controller initiates a pull-down (valve open 100% until case temperature meets the case temperature set point). After pull-down is complete, the case controller will return to normal control.

9 Software Overview

The following section will discuss the frequently used control functions within the RMCC. For specific screen descriptions, please refer to the related screens in **Section 7, *System Navigation***.

9.1. PID Control

Before going into detail about the RMCC's system software, it may be helpful to first talk about the primary method used by the RMCC to control systems such as pressure control, condenser control, case control, and Analog Output Modules.

PID Control is a method of control that attempts to make an input equal to a set point by changing a single output value. PID control is made up of three parts: proportional, integral, and derivative (PID). The proportional part of PID checks the difference between the input and the set point (called the **error**), the integral part measures the error that has existed over time, and the derivative part predicts what the future error will be based on previous rates of change.

The result of the three PID comparisons is an output in the form of a percentage (0-100%). This percentage is used differently in RMCC systems; in pressure control, for example, this percentage corresponds to a percentage of total rack horsepower. For all systems that use PID control, the PID percentage is recalculated at a constant rate, called the **update rate** (usually every 2-6 seconds).

9.2. Programming PID

In order to set up a system that uses PID control, several constants and parameters must be specified. However, most of these constants are pre-configured with default values that do not need to be adjusted. The two values that must be set up for all PID systems are the PID set point and the throttling range.

The PID set point is the desired value of the control input. PID control constantly changes the PID output percentage in an effort to make the control input equal to the PID set point.

Throttling range (sometimes called the "throttle range") is a band of values surrounding the PID set point. The proportional part of the PID output is determined by where the PID input falls within the throttle range (a more detailed explanation is given below in **Section 9.3.,** *How PID Control Operates*).

9.3. How PID Control Operates

Most of the PID output percentage is determined by the proportional part of PID control, which is determined by comparing the input to the set point and throttling range. A simplified illustration showing how proportional mode works is given in ***Figure 9-1***.

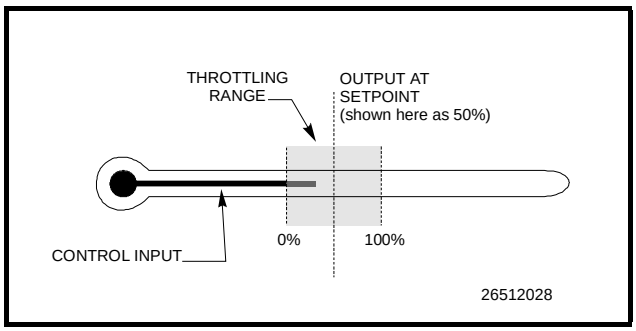

Figure 9-1 *- PID Proportional Mode Diagram*

When the control input is equal to the PID set point, the proportional part of the PID output will be 50% (or, in some cases, whatever value the user specifies as the Output at Setpoint value). The proportional part of PID moves proportionately as the output moves within the throttling range; that is, the output is at 100% when the input is at the top of the throttling range, and the output is at 0% when the input is at the bottom of the throttling range.

The integral part of PID control makes adjustments to the output based on the error that has existed over time. The integral mode is necessary because the proportional mode alone cannot force the control input to match the PID set point; it can only stabilize the control input at a value which may be higher or lower than the set point. The integral mode "grabs" the value and brings it towards the set point.

Finally, the derivative part of PID control observes the rate of change of the input and makes slight adjustments based on the predicted future values of the input. This allows PID control to "catch" a rapidly changing input before it gets too far away from the set point.

A diagram showing the operation of all three modes is shown in ***Figure 9-2***.

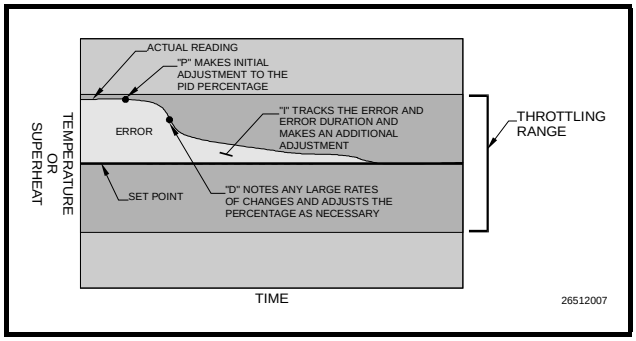
ACTUAL READING
"P" MAKES INITIAL ADJUSTMENT TO THE PID PERCENTAGE
"I" TRACKS THE ERROR AND ERROR DURATION AND MAKES AN ADDITIONAL ADJUSTMENT
THROTTLING RANGE
ERROR
TEMPERATURE OR SUPERHEAT
SET POINT
"D" NOTES ANY LARGE RATES OF CHANGES AND ADJUSTS THE PERCENTAGE AS NECESSARY
TIME
26512007

***Figure 9-2** - Typical PID Control*

9.4. Pressure Control

The RMCC controls temperature within the cases of a circuit by varying the suction pressure of a compressor group based on a user-defined suction set point. The suction pressure is adjusted by cycling compressors on or off, or, in the case of variable speed compressors, adjusting the speed of the compressor.

The RMCC is capable of simultaneously controlling up to four compressor groups with a total of 16 compressor stages designated for any single group. However, no more than 22 compressor stages may be defined for a single RMCC.

Each compressor group may contain a single variable speed compressor, and the RMCC is capable of controlling multiple stages of unloading within each group.

9.4.1. Control Strategies

The RMCC provides two methods for controlling suction pressure: normal and fixed steps. CPC recommends using normal control whenever possible since it provides a greater degree of control over the suction group.

9.4.1.1. Normal (PID Control)

The normal control strategy is a method of managing the suction group using PID control. Normal control measures the suction pressure, compares it to the suction pressure set point, and generates a PID output percentage from 0-100%. This percentage corresponds to the percentage of total compressor horsepower that will be activated. For example, if 15% of a 100 HP compressor rack were called for, one or more compressors totalling 15 HP would be activated.

The normal control strategy varies both the number of compressors and run duration to achieve proper system performance. To initiate the normal control strategy, the user provides the RMCC with the number of compressor stages within the group, the stage type (compressor, variable speed, unloader), and the horsepower of the stage.

9.4.1.2. Fixed Steps

As an alternative to the normal suction pressure control strategy, the RMCC allows the user to build a specific control method for a pressure group using fixed steps.

To initiate the fixed steps strategy, a matrix is built by the user that tells the RMCC when each compressor should be cycled on or off. Because the RMCC can only cycle the compressors based on that matrix, the ability to match available compressor capacity to the refrigeration needs of the system is greatly reduced.

If the fixed steps strategy is selected, only 10 compressor stages may be defined per group.

9.4.2. Variable Speed Compressors

Each of the four suction groups may have one variable-speed compressor. The chief advantage of having a variable-speed compressor in a compressor rack is that a variable-speed compressor can operate at a wide range of horsepowers, whereas a standard compressor may only operate at 100% or 0% capacity. Variable-speed compressors thus allow the RMCC to supply the exact horsepower necessary to maintain the set point.

Variable-speed pressure control may follow either of two strategies in the RMCC pressure control software: the Normal strategy or the Alternate strategy.

9.4.2.1. Normal Strategy

The Normal strategy is the default pressure control strategy used by the RMCC. This strategy dictates that if there is a variable-speed compressor in a suction group, then it will be treated as the primary pressure controlling device, and any other standard compressors in the rack are secondary devices used only if the VS compressor is unable to fully handle the required horsepower. The variable-speed compressor will therefore always be the first compressor on and the last compressor off when the Normal strategy is used.

A flowchart of the Normal strategy's control scheme is shown in ***Figure 9-3***. When an inactive compressor rack receives a call from the RMCC to activate, the variable-speed compressor turns on. The RMCC attempts to operate the VS compressor at the percentage of its maximum horsepower necessary to bring the suction pressure back down. Note, however, that the rate of change is limited by the VS compressor's maximum RPM increase and decrease rates (defined by the user).

If the VS compressor reaches 100% capacity and the RMCC still demands more horsepower, the RMCC will look at the standard compressors available and determine the most appropriate combination of standard compressors

to activate. Some of the criteria for determining the most appropriate combination are:

- Best match to desired horsepower,
- Staging on a compressor before its unloader,
- Matching the minimum on and off times, and
- Equalizing compressor run times.

When the RMCC has activated enough standard compressors to satisfy the HP requirement and the suction pressure begins to decrease below the suction set point, the RMCC will begin decreasing the active compressor HP by first decreasing the RPM of the variable-speed compressor. During this stage of operation, the VS compressor is again the primary pressure control device, and it will be increased and decreased as necessary to maintain the set point. If during this phase the VS compressor reaches 100% capacity and the RMCC requires more HP, the RMCC will again look for a standard compressor combination to activate.

If the VS compressor reaches its minimum capacity and the RMCC still requires less HP, the RMCC will begin to deactivate standard compressors. If there are no standard compressors left to deactivate, the VS compressor will turn off.

The above description of the Normal strategy is only the basic framework of how compressor control works. Other settings in the RMCC may slightly alter the way in which the rack operates, such as:

- Compressor ON and OFF delays,
- Unloader ON and OFF delays,
- Inverter alarming, and
- Specialized settings that keep one or more compressors on during defrost and reclaim modes.

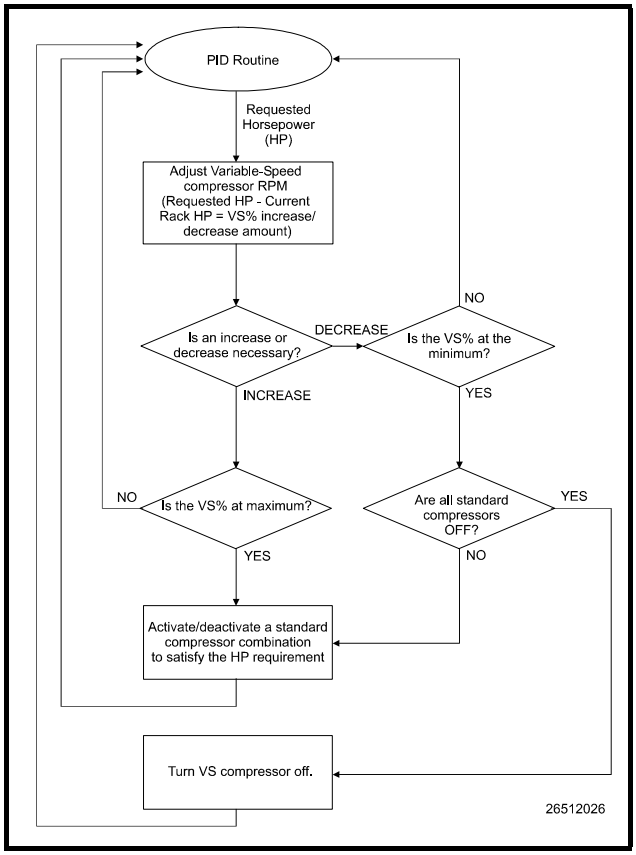

***Figure 9-3** - VS Compressor Control Flowchart*

9.4.2.2. Alternate Strategy

The Alternate strategy is very similar to the Normal strategy described above, except that the VS compressor is not always the first compressor on. Instead, when the RMCC calls for the first compressor(s) to activate, it takes into account the amount of HP needed and considers activating a combination of standard compressors to meet the requirement. For example, if 5 HP is needed and there is a 5 HP standard compressor in the group, the RMCC may activate the standard compressor rather than activate a 15 HP variable-speed compressor.

In order to determine whether the first compressor on will be variable-speed or standard, the RMCC compares the required HP amount to the VS HP On Edge set point. The VS HP On Edge set point is a horsepower value below which the variable speed compressor will not be turned on. If a VS HP On Edge is not entered, the RMCC establishes the value at 50 percent of the maximum horsepower rating of the compressor.

The RMCC will not cycle the variable-speed compressor on until a horsepower value above the VS HP On Edge value is called for. Before that time, the RMCC will cycle the lower capacity standard compressors to try and match system demand. When the variable speed compressor is cycled, it will be brought on at the minimum horsepower rat-

ing (not the On Edge value) and will increase in capacity until the suction pressure requirement is fulfilled.

Once the VS compressor is ON, the compressor rack operates and deactivates in the same manner as the Normal strategy described above.

9.4.3. Floating Set Point

The RMCC is capable of using the average, maximum, or minimum value of the four temperature sensors, or a single value from one of the temperature sensors, as the float temperature.

The Floating Set Point strategy within the RMCC provides a method for varying the suction set point of the group based on the temperature within a circuit. When activated, the Floating Set Point strategy monitors up to four temperature sensors within a circuit and makes adjustments to the suction pressure when the temperature is too low or too high.

The user establishes a range outside of which the RMCC is instructed to make a one pound adjustment to the suction pressure set point to either reduce or increase the case temperature. If the temperature continues to remain outside of the range for a user-defined period of time, the RMCC continues to make pressure set point adjustments until the temperature is within the established range.

By varying the suction pressure set point to match the temperature requirements of the circuit, the RMCC is able to ensure product integrity while achieving maximum rack efficiency.

9.5. Condenser Control

The RMCC is capable of controlling up to 12 condenser fan stages including changes to normal condenser operation based on abnormal system conditions or special system requirements. The RMCC can control both air-cooled and evaporative condensers with either single-, two-, or variable-speed fans.

9.5.1. Control Strategies

9.5.1.1. Air Cooled Condensers

The RMCC may employ either of two strategies to control air-cooled condensers: the Air Cooled strategy or the Temperature Differential strategy.

Air Cooled Strategy

The Air Cooled strategy simply controls condenser fan operation based on a single pressure or temperature value from either the condenser inlet, the condenser outlet, or the discharge line. The Air Cooled strategy activates fans in order to keep this pressure or temperature below the set point (see **Section 9.5.2.,** *Fan Control.* for details).

Temp Differential Strategy

The Temperature Differential strategy attempts to keep a maximum distance between the refrigerant temperature and the ambient (outside) temperature. Refrigerant condensing temperature is measured from the condenser inlet, condenser outlet, or discharge using a pressure transducer. The pressure value is automatically converted to temperature based upon the refrigerant type defined in the system software. The resulting temperature value is compared to the ambient temperature value plus the condensing temperature differential value (specified by the user).

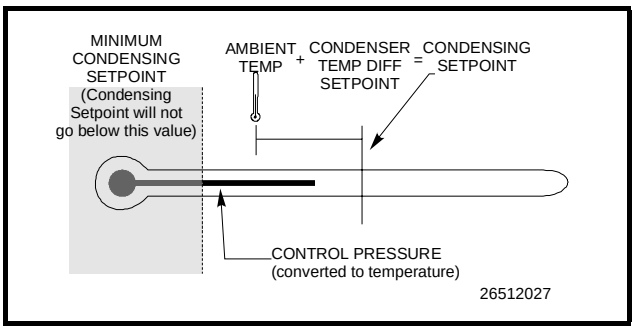

Figure 9-4 *- Temperature Differential Strategy*

As shown in ***Figure 9-4***, the PID set point is proportionally changing in the Temperature Differential strategy based on the ambient temperature value. Therefore, to prevent the PID set point from dropping too low during cold weather, a Minimum Condensing set point may be defined. If the combined total of the ambient temperature and the condensing temperature differential is less than the Minimum Condensing set point, the Minimum Condensing set point becomes the new PID set point.

9.5.1.2. Evaporative Condensers

The RMCC uses a single strategy to control evaporative condenser fans. This strategy uses either the average, the highest, or the lowest of up to five separate temperature or pressure values as the control value. These inputs may be used to control the fan based on sump temperature or condenser pressure values.

The Evaporative strategy activates the fan in order to keep the sump temperature or the combined pressure value below the set point (see **Section 9.5.2.,** *Fan Control.* for details).

9.5.2. Fan Control.

The Output at Setpoint for Condenser Control defaults to 0%, NOT 50% as is the case with most other PID-controlled systems. In other words, proportional mode begins at 0% when the input is equal to the set point and ends at 100% when the input is equal to the set point plus the throttling range.

Regardless of the control strategy used, condenser fans are controlled using PID control (see **Section 9.1.**). The

control value (determined by the control strategy) is compared to the condenser set point and throttling range, and the resulting 0-100% output is used to activate the corresponding percentage of fan capacity. The percentage is used differently based on whether the fans are single-, two-, or variable-speed.

9.5.2.1. Single-Speed Fans

For single-speed fan stages, the percentage corresponds to the number of fan stages. A 75% output in a 12-stage condenser, for example, would activate nine fans. Single-speed fan operation may be further fine-tuned by specifying on/off delays and minimum on/off durations.

9.5.2.2. Two-Speed Fans

A two-speed condenser is a condenser that has either a single set of fans that may operate at two different speeds or two sets of single-speed fans with different horsepower ratings. Generally, two-speed condenser control cycles the fans from off to low and from low to high as the PID output goes from 0% to 100%. Likewise, fans cycle from high to low and from low to off as the PID output goes from 100% to 0%.

Two-speed condenser fans change speeds at three different PID output values: 0%, the cut-on / cut-off value (determined by taking the ratio of the low-speed fans' horsepower vs. the high-speed fans' horsepower), and 100%.

For example, if the low fan's horsepower rating is 10 and the high fan's horsepower rating is 40, the cut-on/cut-off value would be 25% (10 ÷ 40) (see ***Figure 9-5***).

If the fan is currently off (0%) and the condenser calls for 10% of the fan, the low fan will not come on until the condenser calls for 25% of the fan.

At a call for 25%, the low fan will come on and remain on until the condenser calls for 100% fan. At the call for 100% fan, the high fan will turn on and the low fan will turn off.

If the condenser calls for 80% fan, the high fan will remain on even though the percentage is lower than 100%. The high fan will continue to run until the condenser calls for 25% fan. At a call for 25% fan, the low fan will turn on and the high fan will turn off.

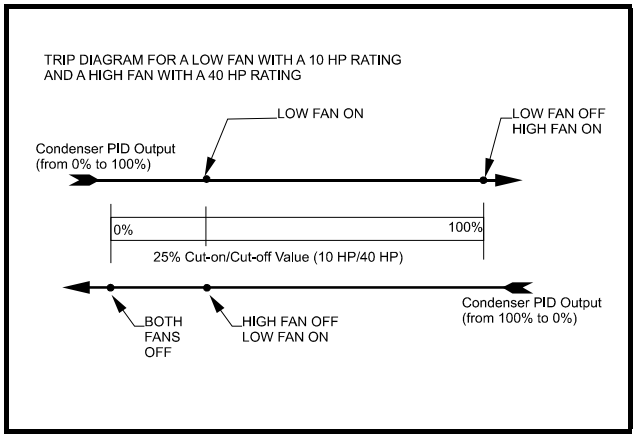

Figure 9-5 *- Diagram of Two-Speed Condenser Operation*

Two-speed fan operation may be further fine-tuned by specifying on/off delays, low-to-high and high-to-low transition delays, specified start speeds and durations, and minimum on/off durations.

9.5.2.3. Variable-Speed Fans

Variable-speed fan control simply interprets the 0%-100% PID output given by the condenser control algorithm as 0%-100% of the fan's maximum output. The percentage at which the fan cuts on and off is determined by the fan's maximum and minimum RPM. The RMCC divides the minimum RPM by the maximum RPM to yield a percentage; any PID output above this value means the fan will be on, and any PID output below this value means the fan will be off.

An example of how variable-speed condenser control works is shown in ***Figure 9-6***. In this example, the Minimum Fan RPM is set to 900, and the Maximum Fan RPM is set to 1800. As the PID output rises from 0% to above the cut-on/cut-off value (Minimum / Maximum RPM, or 50%), the fan activates and begins operating at 900 RPM (the fan's defined Minimum Speed). When the PID output is between the cut-on/cut-off value and 100%, the fan operates at a percentage of the Maximum Fan RPM dictated by the PID output value (i.e. 65% of Maximum RPM when the output is 65%, maximum RPM when the PID is 100%, etc.). The fan continues to operate in this manner until the PID output drops below the cut-on/cut-off percentage, at which time the fan deactivates.

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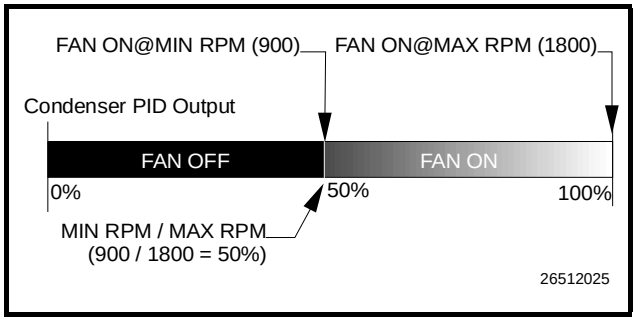


***Figure 9-6** - Diagram of Variable-Speed Condenser Operation*

To fine-tune condenser fan operation, users may specify on/off delays, minimum ON/OFF times, and maximum RPM increase and decrease rates for variable-speed condenser fans.

9.5.3. Operation During Reclaim

During heat reclaim, it may be preferable to raise (or shift) the condenser set point to increase the temperature of the refrigerant in the system. The RMCC provides a user-definable shift value that may be added to the condenser set point. This change is made when the RMCC receives a signal from the RMCC's defined Reclaim input that heat reclaim has been initiated.

9.5.4. Condenser Split (Single-Speed Fans Only)

In cold conditions it may be preferable to reduce the operational capacity of the condenser by either limiting the number of fans that maybe activated or by activating a valve which reduces the effective condensing area of the coil. The RMCC provides a user-defined set point at which a signal is sent to the condenser to initiate split. A different set point is definable for heat reclaim, and a dead band may also be established.

9.5.5. Fail-Safes

9.5.5.1. Fast Recovery

Under certain conditions the system pressure may increase too quickly above the condenser set point to be reduced effectively by normal condenser control. The RMCC provides a user-definable fast recovery rate set point at which the condenser fans are cycled on to reduce system pressure.

Fast Recovery for Air Cooled and Temp Diff Condenser Strategies

When an Air Cooled or a Temperature Differential condenser control strategy is being used, (see **Section 9.5.1.,** *Control Strategies*), the RMCC uses the discharge pressure transducer as the input source for Fast Recovery. In other words, Fast Recovery will initiate whenever the discharge temperature rises above the Fast Recovery set point.

Fast Recovery for Evaporative Condensers

Unlike Air Cooled or Temperature Differential condensers, the Evaporative strategy does not use the discharge pressure transducer in Fast Recovery. Evaporative condensers use the same combination of up to five sensors that is used in condenser fan control. However, users have the option of using the Maximum sensor combination strategy in place of the combination strategy used in condenser fan control.

When the Average or Minimum sensor combination strategy is being used in condenser fan control (see **Section 9.5.1.2.,** *Evaporative Condensers*), a single high sensor value will either be averaged into the other sensor values or ignored entirely. In either case, Fast Recovery would not properly react to high pressures. If either of these strategies are being used, it is recommended that the Maximum strategy be used for the Fast Recovery strategy.

9.5.5.2. Discharge Unsplit (Single-Speed Fans only)

The RMCC will bring a condenser out of split if the system pressure rises to a user-definable unsplit pressure set point.

9.5.5.3. Discharge Trip

If the system pressure continues to rise after all other failsafes have been initiated, the RMCC will shut down all compressors when the user-definable discharge trip set point is reached.

9.6. Circuit Control

The RMCC provides standard defrost and refrigeration control of up to 48 separate circuits. Information on circuit control using case controllers may be found in **Section 5,** ***Case Control***.

9.6.1. Refrigeration

Refrigeration control of a standard circuit involves actuation of the refrigeration liquid line solenoid. The RMCC provides two methods for controlling the solenoid: full and EPR.

When Full control is selected, the RMCC pulses (opens and closes) the solenoid based on whether the temperature within the circuit is above or below the circuit set point. In addition, the RMCC closes the liquid line solenoid whenever defrost is initiated.

When EPR control is selected, the RMCC opens the valve when the system is not in defrost. This allows the temperature in the circuit to be maintained by a mechanical EPR valve or other regulating device. The RMCC closes the liquid line solenoid whenever defrost is initiated.

9.6.2. Defrost

The RMCC provides control for four defrost types: hot gas, off-cycle, electric, and reverse air. If hot gas defrost is configured, the RMCC closes the liquid line solenoid, switches the master liquid line solenoid to divert hot gas from the condenser to the circuit, and opens a defrost solenoid which allows hot gas to flow through the evaporator. If electric defrost is selected, the RMCC closes the liquid line solenoid, and energizes a relay for electric heat. If off-cycle or reverse air defrost is selected, the RMCC only closes the liquid line solenoid.

For each defrost type, the RMCC uses a user-defined defrost schedule to determine when to shift the system from refrigeration to defrost. This schedule is defined at the Circuit Set points screen (see **Section 7.5.24.*, Circuit Set Points 1***).

When a defrost time is reached, the RMCC closes the liquid line solenoid valve and either opens a defrost solenoid valve, activates a relay, or sits idle for a specified period depending on the defrost option selected by the user. Defrost may be ended by either defrost duration, termination temperature, contact closure, or change of state from a thermostat. All options are user-configurable. Defrost may also be ended by bypassing the system on.

9.6.2.1. Drain Time

The RMCC may be configured to wait a specified time period before reentering refrigeration to allow the evaporator coil to dry.

9.6.2.2. Pump Down Delay

The RMCC may be configured to pump down the evaporator coil for a specified period to ensure that refrigerant is not present in the coil when defrost begins.

9.6.2.3. Demand Defrost

The RMCC may be configured to monitor a Demand defrost optical sensor. When the RMCC reaches a scheduled defrost time, it first determines if the sensor has detected frost buildup on the coil. If no frost is detected, the defrost time is skipped. At each subsequent defrost time, the sensor is checked and the same determination is made by the RMCC.

A fail-safe time may be entered to ensure that defrost is initiated if the sensor is malfunctioning.

9.7. Anti-Sweat Control

In a case-controlled refrigeration system, each Case Control Board is capable of operating a single anti-sweat heater. Independent of the Case Controllers, however, the RMCC is also capable of controlling a single circuit of up to eight heaters, which may be used in standard refrigeration circuits or for other applications. Anti-sweat control in non-case-controlled RMCC networks requires a Pulse Modulating Anti-Sweat Control panel (P/N 809-1105).

Case-controlled anti-sweat may control the case heaters using either the humidity or dewpoint value (see ***Anti-Sweat Control,* page 5-7**). Standard circuit systems control by dewpoint only; however, this may be supplied either by a dewpoint probe or by an automatic calculation from temperature and relative humidity sensor values. The circuit's dewpoint temperature is compared to two user-defined values: the All Off and All On values.

If the circuit's dewpoint is lower than the All Off set point, all the anti-sweat heaters will remain off. If the circuit's dewpoint is higher than the All On set point, all the anti-sweat heaters will be 100% on. If the dewpoint falls between the All Off and All On set points, the anti-sweat heaters will pulse on and off for a percentage of a user-defined time window (1-999 seconds). The percentage of time in which the heaters will be on depends upon where the circuit's dewpoint falls between the range of dewpoints formed by the All Off and All On set points. The percentage is figured by using the following equation:

$$\%\ ON = \frac{\text{measured dewpoint - All Off set point}}{\text{Alll On set point - All Off set point}}$$

Figure 9-7 illustrates the operation of an anti-sweat circuit with a time window of 10 seconds, an All Off dewpoint of 20°F, and an All On dewpoint of 70°F. If a dewpoint of 45°F is measured in the circuit, the anti-sweat heaters will operate at 50%. This is because the 45°F dewpoint is directly between the All On and All Off set point. The heaters, therefore, will be on for five seconds and off for five seconds. A measured dewpoint of 30°F will result in the heaters being on 20% of the time.

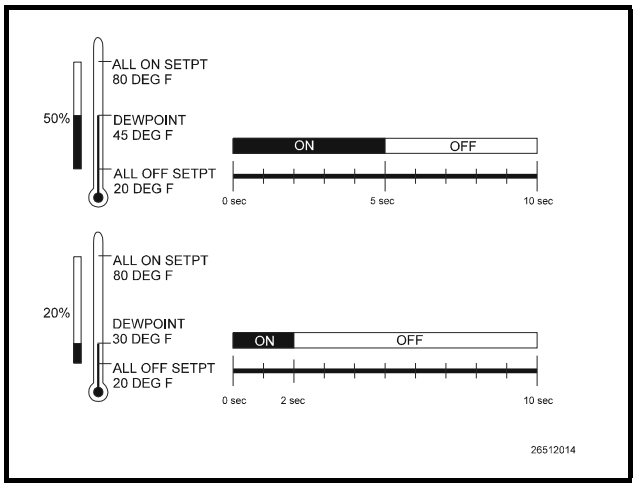


***Figure 9-7** - Illustration of Anti-Sweat Control*

Each anti-sweat heater output may be configured to override OFF when a defined contact closure is detected.

Anti-sweat heaters may also be overridden manually from the RMCC front panel or by using UltraSite.

9.8. Sensor Control

The RMCC can monitor a total of 48 generic sensors configured by the user.

Section 7.6., ***Sensor Control***, provides the set points and setup functions necessary to customize a generic sensor input. Users may select from several sensor types and may make adjustments to gain and offset to ensure accurate values are read by the RMCC. On, off, and delay values, entered at the sensor set points screen **Section 7.6.5.**, determine when a generic output will be activated.

A generic sensor input is tied to a generic sensor output by defining a board and point for the sensor output under **Section 7.9.2.,** ***Output Definitions***.

9.9. Input/Output Control

RMCC Input and Output Modules are not programmable from the RMCC front panel. I/O Modules may only be programmed using UltraSite version 1.31 or greater. For specific I/O Module programming instructions, see the UltraSite User's Guide RMCC Supplement (P/N 026-1005).

Input/Output, or I/O Control, is a method of controlling refrigeration and building control using user-configured modules that both interpret and manipulate data from input components, and monitor and control mechanical equipment.

The traditional approach to component control is through the use of applications. Applications are boilerplate programs that provide the user with a fill-in-the-blank method of controlling common building functions. Such systems are flexible only in that the existing inputs, outputs, settings, and set points are configured by the user; the ability to manipulate and customize the control framework is nonexistent when using the applications approach.

Most standard refrigeration circuit control, condenser control, and lighting schedule control functions still use the applications approach. These common control functions require the ability to simultaneously control many components with similar or different set points.

While applications are a quick, easy-to-understand way to control conditions within a building, they do suffer from a lack of flexibility. Many of today's refrigeration control environments require a greater degree of latitude that allows for complex overriding and scheduling features not available with the traditional applications approach.

I/O Control, while sacrificing the boilerplate ease of applications, provides the user with the ability to completely customize control of mechanical components.

9.9.1. Cells and Modules

I/O Control is best defined as the process of reading a sensor value, comparing the value to a set of user-defined set points, and activating or deactivating a load based on the comparison. Unfortunately, control of large systems requires multiple layers of set points that have different priorities and control many loads. To simplify this complex array of set points, the RMCC uses the concept of cells and modules.

Cells are groups of set points that share common functions or priorities, such as Override or Proof set points. While different types of cells perform different functions in different applications, all cells are basically alike in their operation. A cell reads one or more input values, applies these values to the cell's settings and set points, and exports one or more resultant values as outputs. Depending upon the set function of the cell, the cell's outputs may then be used as inputs for other cells or modules, or they may be used to drive physical devices.

The number of cells used within the RMCC's I/O modules is fixed and comprises the various controlling features of the RMCC, such as Alarming, Logging, Overrides, Bypassing, etc. The arrangement of these cells may not be changed. The user may choose to use certain cells and not others, but may not add, delete, or rearrange features in the RMCC.

Various cells that share a common bond such as manipulating a sensor value or providing a control command to a physical relay are grouped together within a **Module**. A module may be used alone or combined with other modules. Unlike cells, modules may be connected in many different ways depending on the needs of the user.

Figure 9-8 provides an example of the relationship between set points, cells, and modules. Set points—such as the limiting, cut-in, and cut-out set points shown—are organized into cells. These cells use their set points, along with the cell's inputs, to perform certain functions that generate output values. These cells, along with other cells, fit into the fixed structure of a module, where each cells' functions work together. The module may then be connected via its inputs and outputs to other sensors, output devices, and I/O modules in a variety of control applications.

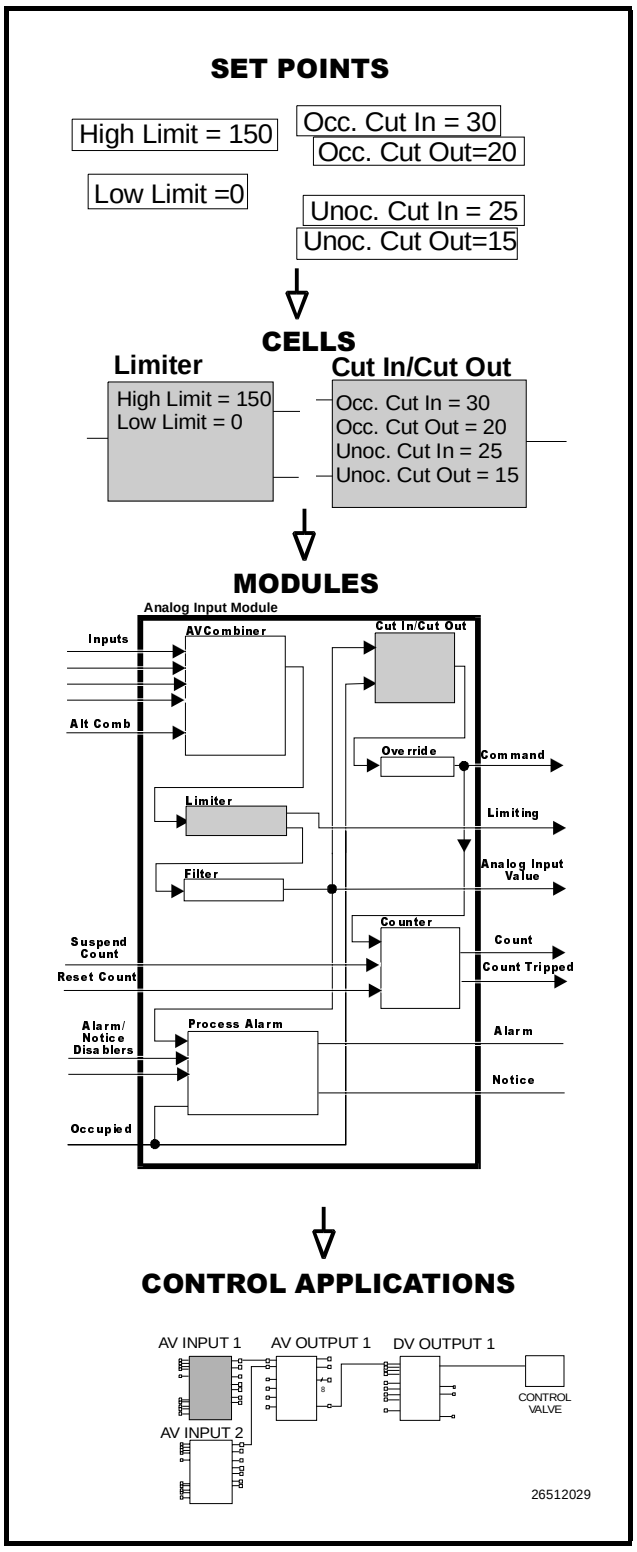


Figure 9-8 *- Relationship Between Set Points, Cells, and Modules*

The RMCC uses three kinds of modules: Analog Output Modules, Analog Input Modules, and Digital Output Modules. In general, the cells grouped within the Analog Input and Digital Output Modules are those cells that are necessary to combine several analog or digital values into a single control value that may be used by physical devices or other modules. The cells grouped within the Analog Output Module are those cells that control an output using a closed-loop PID control method.

9.9.1.1. Programming Cells and Modules

In UltraSite, set points for RMCC I/O Modules are grouped together in their respective cells. Modules, therefore, may be easily programmed cell by cell.

Up to 24 separate Analog Input Modules, 16 separate Digital Output Modules, and 8 Analog Output Modules may be configured within the RMCC. Although the user may not change which cells fall within the two types of modules, users may often customize a module's functions by disabling certain cells.

9.9.1.2. Module Inputs and Outputs

The inputs used to drive I/O Modules may come from external I/O board inputs and outputs, other I/O Module outputs, or a number of RMCC internal values, including: pressure control, sensor control, anti-sweat control, case control, and circuit control inputs. Most module inputs can also be set up as constant analog or digital values.

Digital inputs and outputs of I/O modules may be any of three states: OFF, ON, or NONE. The NONE state in most respects is interpreted to be the same as OFF, except NONE represents "don't care" rather than "off". In certain input combining strategies, a NONE input will be ignored, whereas an OFF input will be read as an input value.

An example of this is the Analog Input Module's "First" strategy, which passes the first of four defined inputs along to a module's output. If Input #1 of a module is NONE, the First strategy will skip Input #1 and use the value of Input #2. If Input #1 is zero or OFF, the First strategy would use the value of Input #1.

Some digital I/O outputs may also be configured with user-specified definitions of ON and OFF. For example, instead of having an output be either ON or OFF, a user may configure the output be ON/NONE, NONE/OFF, or even OFF/ON.

9.9.2. RMCC I/O Module Descriptions

9.9.2.1. Analog Input Module

General Description

The primary purpose of the Analog Input Module is to combine up to four analog inputs (from either analog sensors or Analog Output Modules) into a single analog output value. This value may then be sent to other modules or physical devices, and it may also be compared to cut in/cut out set points to generate a digital signal. Secondarily, the Analog Input Module generates alarms and notices, and

processes override commands. A diagram of the Analog Input Module is shown in ***Figure 9-9***.

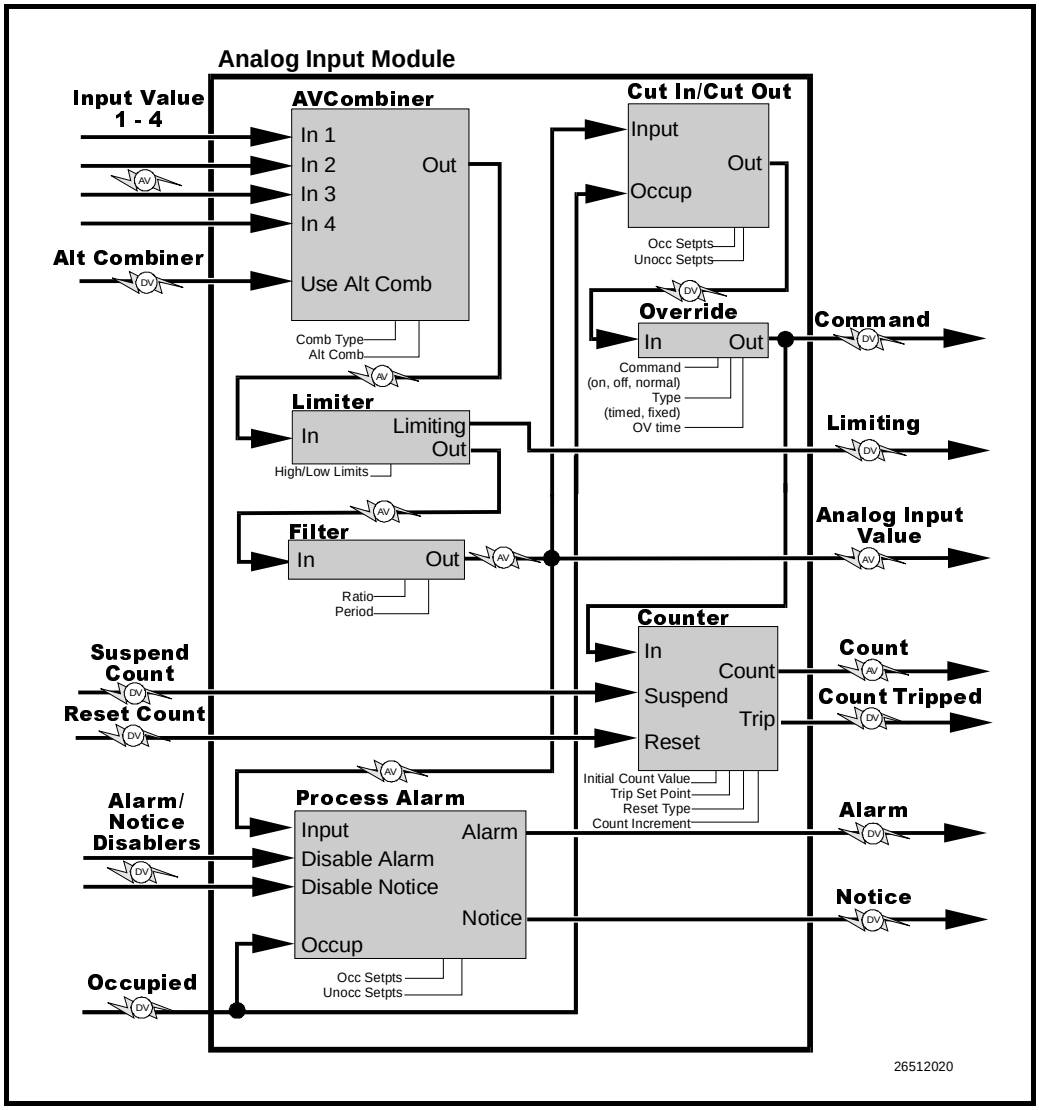


Figure 9-9 *- Analog Input Module*

Inputs

Input Value 1-4 (In1-In4)

Up to four analog inputs may combined in an Analog Input Module.

Alt Combiner (Use Alt Comb)

The Analog Input Module allows for a user to specify two different input combination strategies: a primary combination type, and an alternate combination type. The module reads the state of the Alt Combiner input to determine which combination method to use.

Suspend Count and Reset Count

The Analog Input Module has a cell (called the Counter cell) that counts the number of times the Digital Command output goes from OFF to ON. There are two inputs that manipulate the module's Counter cell. The Suspend Count input, while ON, prevents the Counter cell from counting ON transitions. The Reset Count input supplies a digital signal that resets the Counter cell to its user-specified initial value.

Alarm Disable and Notice Disable

The Alarm Disable and Notice Disable inputs affect the Analog Input Module's ability to generate alarms and notices. When the alarm disable input is HIGH, the Analog Input Module's Process Alarm cell will not be able to activate the alarm output. Likewise, when Notice Disable is high, the Notice output will not be allowed to activate.

Occupied (Occup)

The state of this input tells the Analog Input Module that the building is either occupied or unoccupied.

Cells

Analog Value Combiner (AVCombiner)

The AVCombiner cell's function is to read up to four input values, combine these values into a single value (based on the combination strategy), and send the combined value to the Limiter cell.

Two different combination strategies may be specified by the user: a primary combination strategy and an alternate combination strategy. The primary combination strategy will be used whenever the Use Alt Comb input is OFF. When the Use Alt Comb input is HIGH, the alternate combination will be used. If an alternate combination strategy is not desired, only the primary combination strategy needs to be defined.

Limiter

The Limiter cell simply applies a user-defined set of high and low limits to the value leaving the AVCombiner cell. If the combined value is greater than the specified high limit value, the Limiter cell will block the combined value from the rest of the module and replace it with the high limit value. Likewise, when the combined value is lower than the low limit value, the low limit value will be substituted. This limited analog value is passed on to the Filter cell.

The Limiter cell also commands a digital output, called the Limiting output. This output is ON when the Limiter cell is enabled and OFF when the Limiter cell is disabled.

Filter

The Filter cell's primary function is to slow the rate of change of the combined input. The filter reads the difference between the current input value and the input's value *x* seconds ago, where *x* = a user-specified amount of time (called the "period"). The difference between these two values is multiplied by the filter ratio, which is a percentage between 0% and 100%. The result of this multiplication is the filtered output value. Note that if the filter ratio is at 100%, or if the Filter cell is disabled, the input is not modified by the Filter cell.

The Filter output value is the final Analog Input Module Value. This value is also sent to the Process Alarm cell and the Cut In/Cut Out cell for use in alarm generation and digital output control.

Process Alarm

The Process Alarm cell reads the Analog Input Module Value from the Filter cell and compares it to the notice and alarm set points defined by the user. When an alarm condition is detected, the Process Alarm cell sends digital values to the Alarm or Notice outputs and sends an alarm message to the RMCC Alarm Log.

Different set points may be specified for occupied or unoccupied building states. The Process Alarm cell reads the digital state of the Occup input to determine which set of set points to use (HIGH=occupied, LOW=unoccupied).

If the input exceeds a high set point or falls below a low set point for an amount of time greater than the specified delay period, the corresponding Alarm or Notice Output will turn ON.

The Alarm Disable and Notice Disable inputs, when HIGH, force the Alarm and Notice Outputs OFF.

Cut In/Cut Out

The Cut In/Cut Out cell's function is to read the Analog Input Module Value from the Filter cell, compare it to a set of user-specified cut-in and cut-out set points, and turn an output ON or OFF based on the results of the set point comparison.

Users may specify different cut-in and cut-out set points for occupied and unoccupied building states. The cell uses the occupied set points when the Occupancy input reads HIGH and the unoccupied set points when the Occupancy input reads LOW.

The Cut In/Cut Out cell's digital signal is sent to the Override cell.

Override

The primary purpose of the Override cell is to provide a method of overriding the Digital Command output to a user-specified value instead of the value dictated by the Cut In/Cut Out cell. Unlike other Analog Input Module cells, the Override cell may be accessed from the RMCC front panel without using UltraSite. The RMCC's Analog Input Module Bypass screen is shown below.

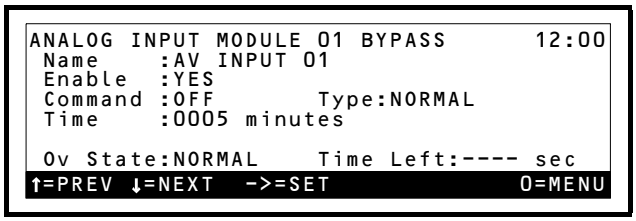


Figure 9-10 *- Analog Input Module Bypass Screen*

The Override cell may override the Digital Command output ON, OFF, or NONE. The override may be either fixed or timed. A fixed override remains overridden until the user deactivates the override using the Analog Input Module Bypass Screen. A timed override remains in effect until a user-specified time period elapses or until the user cancels the override.

Counter

The Count cell simply increments the Count output value every time the digital Command output turns ON. The initial value of the Count output is entered by the user, as well as the amount the Count output is incremented every time an ON is detected.

If desired, the Count cell may also be configured to turn on a digital output whenever the Count value exceeds a user-specified Trip Setpoint. This digital output, called the Count Tripped output, may be connected to a relay on an alarming device, or it may be used as an input for another I/O Module.

The Count output value is reset by sending a signal to the Reset Count input. The user specifies whether the count will be reset when the Reset Count is ON, OFF, or transitioning from ON to OFF. When the appropriate type of signal is read from the Reset Count output, the Count output reverts to the initial value specified by the user.

Counting may be suspended via the Suspend Count input. While this input is ON, the Counter will not increment the Count output regardless of the state of the Command output.

9.9.2.2. Digital Output Module

General Description

The primary purpose of a Digital Output Module is to combine up to four digital values into a single digital value, which may drive a physical relay or be used as an input for other modules. In addition, the Digital Output Module may be configured to count the number of Output transitions, and it may be set up to detect proof failures. The Digital Output Module is shown in ***Figure 9-11***.

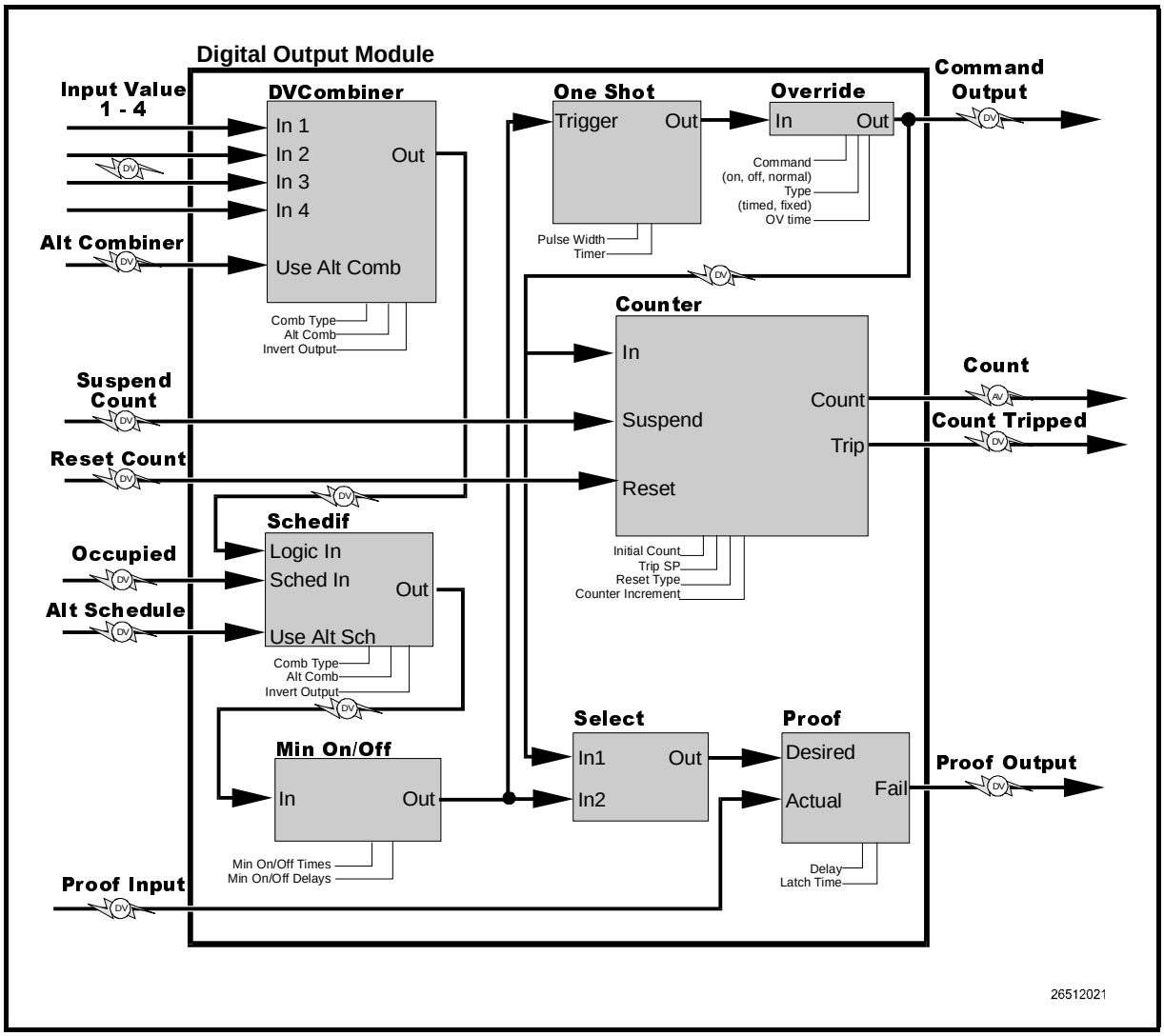


Figure 9-11 *- Digital Output Module*

Inputs

Input Value 1 - 4 (In1-In4)

Up to four digital inputs may be combined in a Digital Output Module.

Suspend Count and Reset Count

The Digital Input Module has a cell (called the Counter cell) that counts the number of times the Output goes from OFF to ON. There are two inputs that manipulate the mod-

ule's Counter cell. The Suspend Count input, while ON, prevents the Counter cell from counting ON transitions. The Reset Count input supplies a digital signal that resets the Counter cell to its user-specified initial value.

Occupied (Occup)

The state of this input tells the Digital Output Module that the building is either occupied (ON) or unoccupied (OFF).

Alt Combiner (Use Alt Comb)

The Digital Output Module allows for a user to specify two different input combination strategies: a primary combination type and an alternate combination type. The module reads the state of the Alt Combiner input to determine which combination method to use.

Alt Schedule (Use Alt Sched Comb)

After the module's Digital Inputs are combined in the DVCombiner, the Digital Input Module allows the user the option of combining the resulting value with the value of the Occupied (Occup) input. Two different combination strategies may be chosen: a primary combination type, and an alternate combination type. The module reads the state of the Alt Schedule input to determine which combination method to use.

Proof Input

The Digital Output Module issues a command (called a proof failure command) as a result of comparing the final control value issued by the module with a digital value called the Proof Input. The Proof Input is most often hooked to the physical device being controlled by the Digital Output Module's Output, so that the RMCC has a means of assuring that the device is being properly activated and deactivated.

Cells

Digital Value Combiner (DVCombiner)

The DVCombiner cell's function is to read up to four digital input signals, combine these signals into one value (based on the combination strategy), and send the combined value to the Schedif cell.

Two different combination strategies may be specified by the user: a primary combination strategy and an alternate combination strategy. The primary combination strategy will be used whenever the Alt Combiner input is LOW. When the Alt Combiner input is HIGH, the alternate combination will be used. If an alternate combination strategy is not desired, only the primary combination strategy needs to be defined.

Schedule Interface Combiner (Schedif)

The Schedif cell gives users a method of modifying the combined value of the Digital Inputs based upon the occupied or unoccupied state of the building. Using a user-defined strategy, the Schedif cell combines the input value from the DVCombiner cell with the Occup input. The result is then sent to the Min On/Off cell.

While the Schedif cell's function is similar to the DVCombiner cell's function, their combination strategies are not similar. The Schedif cell's combination strategies are specially made for occupancy-driven control, and are not as logic-based as the DVCombiner strategies.

Two different combination strategies may be specified by the user: a primary combination strategy and an alternate combination strategy. The primary combination strategy will be used whenever the Use Alt Comb input is LOW. When the Use Alt Comb input is HIGH, the alternate combination will be used. If an alternate combination strategy is not desired, only the primary combination strategy needs to be defined.

Min On/Off

The Min On/Off cell gives users a method of assuring that the Digital Output Module's Command Output remains ON for a minimum amount of time and/or OFF for a minimum amount of time—regardless of the input value read from the Schedif cell.

Every time a change of state is detected in the input value, the Min On/Off cell begins to actively measure the length of time the input remains in its current state. If the input switches from ON to OFF before a user-specified Minimum On duration is reached, the output signal being sent from the Min On/Off cell will not reflect the input's change of state; it will remain ON until the Minimum On duration has passed. If the input is still OFF when the duration is over, the output will switch OFF.

The reverse is true with the Minimum Off duration. If the input signal switches ON before the Minimum Off duration is reached, the output signal from the Min On/Off cell will remain OFF until the duration has passed.

One Shot

Some applications for the Digital Output Module require digital pulses instead of ON/OFF logic. The One Shot cell, when enabled, reads the ON/OFF output from the Min On/Off cell and sends a digital pulse whenever a user-defined transition type is detected. The pulse width of the One Shot cell's pulse is defined by the user, as is whether the pulse is a Momentary OFF, Momentary ON, or Change of State pulse.

If the One Shot cell is not enabled, the output value will pass the input value on to the Override cell without modification.

Override

The primary purpose of the Override cell is to provide a method of overriding the Digital Output Module Output to a user-specified value instead of the value dictated by the One Shot cell. Unlike other Digital Output Module cells, the Override cell may be accessed from the RMCC front

panel without using UltraSite. The RMCC's Digital Output Module Bypass screen is shown below.

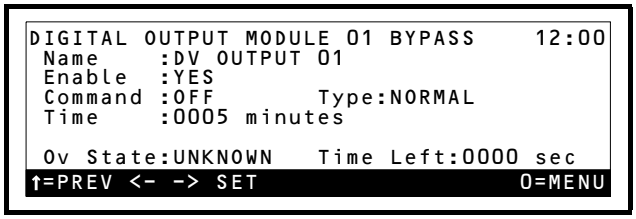


***Figure 9-12** - Digital Output Module Bypass Screen*

The Override cell may override the Digital Command output to ON, OFF, or NONE. The override may be either fixed or timed. A fixed override remains overridden until the user deactivates the override using the Digital Output Module Bypass Screen. A timed override remains in effect until a user-specified time period elapses or until the user cancels the override.

Counter

The Count cell simply increments the Count output value every time the Command Output turns ON. The initial value of the Count output is entered by the user, as well as the amount the Count output is incremented every time an ON is detected.

If desired, the Count cell may also be configured to turn on a digital output whenever the Count value exceeds a user-specified Trip Setpoint. This digital output, called the Count Tripped output, may be connected to a relay on an alarming device, or it may be used as an input for another I/O Module.

The Count output value is reset by sending a signal to the Reset Count input. The user specifies whether the count will be reset when the Reset Count is ON, OFF, or transitioning from ON to OFF. When the appropriate type of signal is read from the Reset Count output, the Count output reverts to the initial value specified by the user.

Counting may be suspended via the Suspend Count input. While this input is ON, the Counter will not increment the Count output regardless of the state of the Command output.

Select

The Select cell's primary function is to send either of two values to the Proof cell: the output value from the Min On/Off cell, or the final Command Output value from the Override cell.

In most cases, the final Command Output value would be used for proof checking, since this Output will be mirroring the Proof input. However, for relays or modules that are controlled by digital pulses (supplied by the One Shot cell), the pulse from the output will not match the Proof input. In these cases, the logical signal from the Min On/Off cell may be used as the Proof value.

Proof

The Proof cell compares the Select cell's output value to an external digital input and turns on the Proof Fail Output when the two inputs are not the same for a specified amount of time. The most common application of this cell is to connect the Proof input to the external device being controlled by the Command Output, so that the Proof Fail Output may be used as an indicator of device failure.

In order for the Proof Fail Output to be activated, the two inputs must be different for an amount of time equal to the user-specified delay.

9.9.2.3. Analog Output Module

The Analog Output Module's main function is to read the value of an analog input, compare the value to a set point, and generate a single analog output value. This output value is represented in three different forms: a single analog value from 0% to 100%, up to eight digital stage outputs, and a digital pulse width modulation output.

The output value(s) are generated by a PID Control cell, which takes into account both the input's instantaneous value and its rate and direction of change. In many ways, the PID Control algorithm is similar to the PID algorithm used by Pressure Control, except the Analog Output Module is designed to be used in a wider array of applications. Refer to **Section 9.4.1.1.,** *Normal (PID Control)*, for more information about PID control.

A diagram of the Analog Output Module is shown in ***Figure 9-13***.

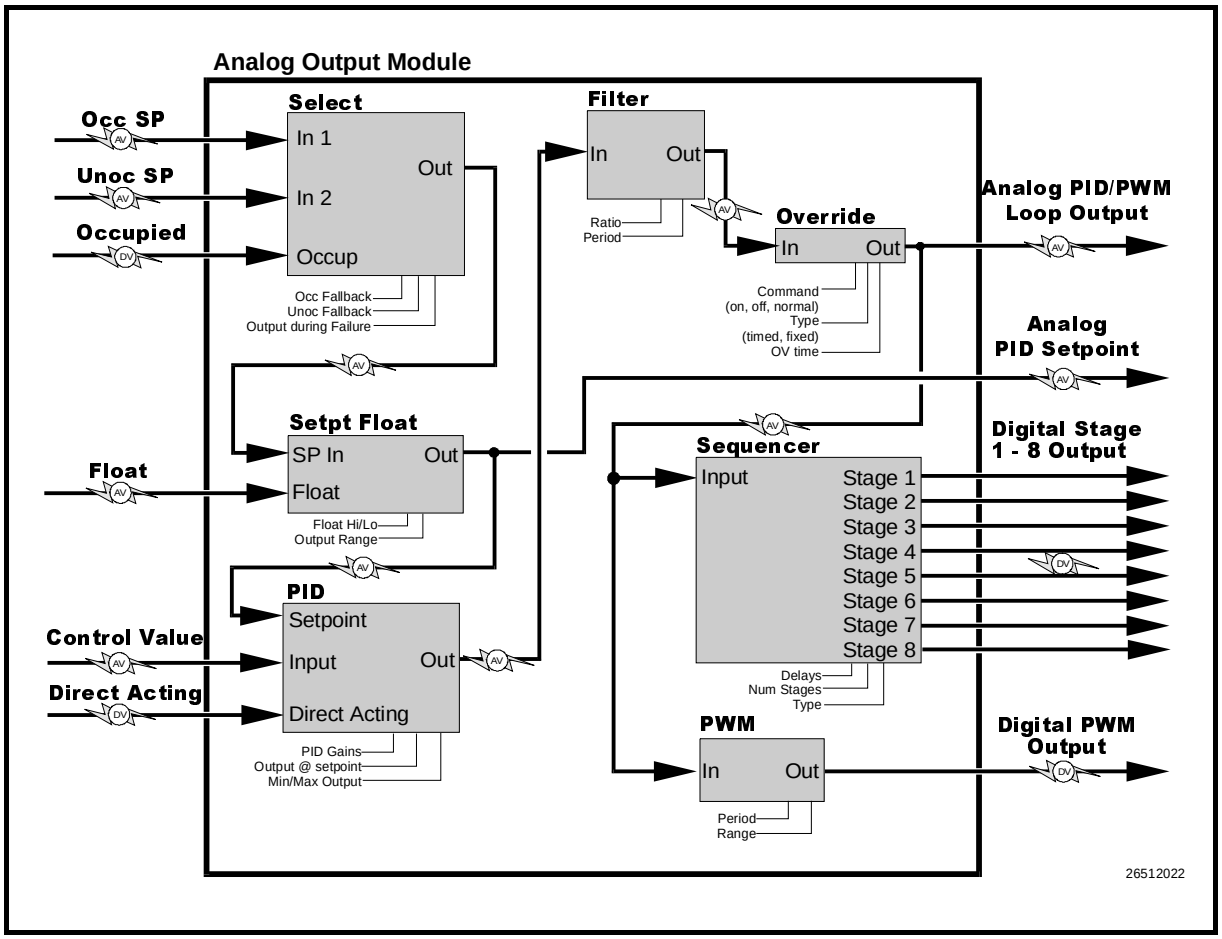


Figure 9-13 *- Analog Output Module*

Inputs

Control Value

The Control In value is the primary signal the Analog Output Module uses in PID control.

Float

The Float Control input provides an analog value to the Analog Output Module's Setpoint Float cell, which is used to adjust, or "float," the PID setpoint value.

Occupied (Occup)

The state of this input tells the Analog Output Module that the building is either occupied or unoccupied.

Occupied Setpoint/Unoccupied Setpoint (Occ SP/ Unoc SP)

The Occ SP and Unoc SP values are the PID set point values used during occupied and unoccupied building times. These set points may be fixed values specified by the user, or they may be inputs from sources within or outside the RMCC.

The Analog Output Module uses either the Occ SP or the Unoc SP as the control set point based upon the status of the Occup input (ON=occupied, OFF=unoccupied).

Direct Acting

The Direct Acting input determines how the output of the Analog Output Module changes in relation to the input. When the Direct Acting output is ON, the output value will move in the same direction as the input value; in other words, when the input value increases, the output value increases. When the Direct Acting input is OFF, the output value will move in the opposite direction as the input value.

The primary purpose of the Direct Acting input is to allow a single Analog Output Module to control both cooling (typically requiring direct action) and heating (typically requiring reverse action) with a single input and output.

Cells

Select

The Select cell's primary function is to select either the Occ SP or Unoc SP analog signals to be used as the Analog

Output Module's PID Setpoint. To perform this function, the Select cell reads the value of the Occup input; if this value is HIGH, the Select cell sends the Occ SP analog signal to the Setpt Reset cell. If the Occup value is LOW, the Select cell sends the Unoc SP analog signal to the Setpt Float cell.

Because the Occ SP and Unoc SP values may be supplied by external analog signals—and because the Analog Output Module requires a set point value to function correctly—the Select value may be programmed with "fallback" set points, which are used if the set point values become corrupted.

As an added safety measure, the Analog Output Module may be programmed to supply a fixed numerical value that will be used as the PID Output in case the set point or control input(s) become corrupted.

Setpt Float

The Setpt Float cell provides users with a method of raising and lowering the PID Setpoint based on the value of the Float Control input. This cell is primarily designed for heating and cooling applications, such as modifying space temperature set points based on outside air temperature sensor values.

To set up the Setpt Float cell, users must supply three set point values: a High Float Value, a Low Float Value, and an Output Range.

The Output Range is the maximum amount that the PID Setpoint may vary. An Output Range of 4, for example, means that the PID Setpoint input being read from the Select cell may only be increased by 2 or decreased by 2.

The High Float Value and Low Float Value form a range of values that determines what portion of the Output Range is applied to the final PID Setpoint. For the example shown in ***Figure 9-14***, a Setpt Float cell is set with a High Float Value of 100, a Low Float Value of 0, and an Output Range of 4. Consequently, when the Float Control input is at 100, the PID Setpoint is modified by +2. When the Float Control is 0, the PID set point is modified -2. For all Float Control values in between the Low and High values, the PID set point modification varies linearly.

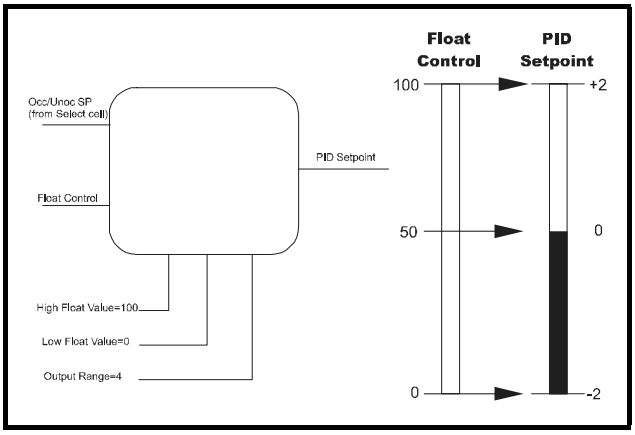


Figure 9-14 *- Example of a Setpt Float cell*

The output value of the Setpt Float cell is the final PID Setpoint value that will be used by the PID Control cell.

PID Control

The PID Control cell uses a PID algorithm (see **Section 9.1.,** *PID Control*) to compare the Control Value with the PID Setpoint values. From this comparison, an analog output representing a 0% - 100% data range is generated. The PID control cell repeats this command sequence in a constant loop every few seconds.

The 0% - 100% output from the PID Control cell is passed along to the Filter cell. Users have the option of bypassing PID altogether, in which case the Control Value is passed unaltered to the Filter cell.

Filter

The Filter cell's primary function is to slow the rate of change of the PID cell's output. The filter reads the difference between the current value and the value *x* seconds ago, where *x* = a user-specified amount of time (called the "period"). The difference between these two values is multiplied by the filter ratio, which is a percentage between 0% and 100%. The result of this multiplication is the output value. Note that if the filter ratio is at 100%, or if the Filter cell is disabled, the input is not modified by the Filter cell.

The Filter output value is sent to the Override cell.

Override

The primary purpose of the Override cell is to provide a method of overriding the analog output going to the Sequencer and PWM cells to a user-specified value instead of the value dictated by the Filter cell. Unlike other Analog Output Module cells, the Override cell may be accessed from the RMCC front panel without using UltraSite. The RMCC's Analog Input Module Bypass screen is shown in ***Figure 9-15***.

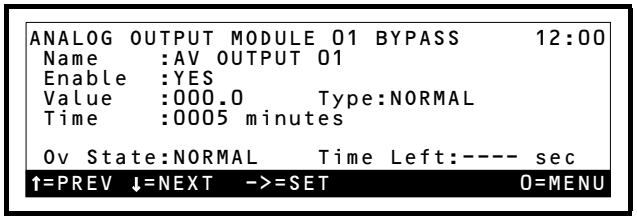


Figure 9-15 *- Analog Output Module Bypass Screen*

The Override cell may override the output to any value between 0% and 100%. The override may be either fixed or timed. A fixed override remains overridden until the user deactivates the override using the Analog Output Module Bypass Screen. A timed override remains in effect until a user-specified time period elapses or until the user cancels the override.

The output from the Override cell is the final Analog PID/PWM Loop Output. This value is also sent to the Sequencer and PWM cells.

Sequencer

The Sequencer cell simply activates a certain percentage of the Digital Stage 1-8 Outputs based on the percentage of the PID output. For example, if the PID output is 50%, the Sequencer cell will activate 50% of the total defined outputs. The Sequencer cell always rounds the PID value down; in other words, if there are four stages defined in a Sequencer cell and the output is 74%, the Sequencer cell will treat the output value as 50% and only activate two stages. If the output then climbed above 75%, however, a third stage would come on.

If desired, delays may be specified for stage activation and deactivation. Also, the definitions of ON and OFF may be defined as either ON, OFF, or NONE. In other words, when the Sequencer cell calls for an output to be ON or OFF, the actual output can be configured to be NONE/OFF, ON/NONE, or even OFF/ON.

PWM

The PWM cell (short for Pulse Width Modulation) converts the PID output percentage to a periodic ON pulse. The period of time over which the pulse takes place is called the Output Time. The PWM cell turns the PWM output ON for a percentage of the Output Time equal to the PID percentage. For example, if the PID output is 60% and the Output Time is 10 minutes, the PWM output would be ON for six minutes and OFF for four minutes. After the Output Time has passed, the PWM starts over again with the new PID percentage.

10 System Configuration Guide

This guide can be used for the general configuration of an RMCC system. The System Configuration Guide presents the steps for general configuration of an RMCC. Some steps of this guide can be skipped if the RMCC is not to perform the functions defined. Before attempting to program the RMCC, decide what functions the RMCC will perform and then identify what sections are pertinent to the configuration.

10.1. General

1. Make All Network and Power Connections
2. Define Board Types and Numbers—**Section 11.8.21.,** *Set Device Numbers*

10.2. Setup Compressors

1. Name Pressure Groups and Define the Number of Compressors Used—**Section 11.2.6.,** *Compressor Setup*
2. Setup Pressure Group (Groups 1–4 are Accessible from this Screen)—**Section 11.2.7.,** *Group 1 Setup*
3. Define Pressure Options—**Section 11.2.8.,** *Pressure Setup*
4. Define Two Stage System Setup—**Section 11.2.9.,** *Two Stage System Setup*
5. Set Pressure Setpoints for the Group (Groups 1–4 are Accessible from this Screen)—**Section 11.2.10.,** *Group 1 Pressure Set Points*
6. Define Variable Speed Set Points (Groups 1–4 are Accessible from this Screen)—**Section 11.2.11.,** *Group 1 Variable Speed Set Points*
7. Set Floating Suction Set Points (Groups 1–4 are Accessible from this Screen)—**Section 11.2.12.,** *Group 1 Floating Suction*
8. Define Group Control Strategy (Groups 1–4 are Accessible from this Screen)—**Section 11.2.13.,** *Group 1 Strategy Setup*

10.3. Setup Condensers

1. Condenser Setup—**Section 11.3.1.,** *Condenser Setup*
2. Define Condenser Input & Output Pressure—**Section 11.3.2.,** *Condenser Pressure Inputs Setup (Air-Cooled & Temp Diff Strategies Only)*
3. Define Condenser Fan Delays—**Section 11.3.4.,** *Condenser Fan Delays Setup*
4. Setup Condenser Fan
   Single Speed Condenser Fan—**Section 11.3.5.,** *Condenser Single-Speed Setup Screens*
   Two Speed Condenser Fan—**Section 11.3.6.,** *Condenser Two-Speed Fan Setup*
   Variable Speed Condenser Fan—**Section 11.3.7.,** *Variable-Speed Setup Screens*
5. Define Condenser Fan Fail
   For Single Speed Fans—**Section 11.3.5.3.,** *Condenser Fan Fail Setup*
   For Two Speed Fans—**Section 11.3.6.3.,** *Condenser Fan Fail Setup*
6. Define Condenser Split Setpoints (Single Speed Condenser Fans Only)—**Section 11.3.10.,** *Condenser Split Setpoints*

10.4. Setup Standard Circuits

1. Setup Standard Circuit
   - Screen 1—**Section 11.4.16.,** *Circuit Setup 1*
   - Screen 2—**Section 11.4.17.,** *Circuit Setup 2*
2. Define Standard Circuit Set Points
   - Screen 1—**Section 11.4.18.,** *Circuit Set Points 1*
   - Screen 2—**Section 11.4.19.,** *Circuit Set Points 2*
   - Screen 3—**Section 11.4.20.,** *Circuit Set Points 3*
   - Screen 4—**Section 11.4.21.,** *Circuit Set Points 4*
4. Define Circuit Inputs—**Section 11.4.22.,** *Circuit Inputs Setup*
5. Define Circuit Outputs—**Section 11.4.23.,** *Circuit Output Setup*
6. Setup Advanced Defrost—**Section 11.4.24.,** *Advanced Defrost*
7. Setup Advanced Defrost Option
   - Hot Gas—**Section 11.4.25.,** *Advanced Defrost Options (Hot Gas)*
   - Electric—**Section 11.4.26.,** *Advanced Defrost Options (Electric)*

10.5. Setup Case Control

1. Define CCB Set Points Screen 1
   - Liquid Pulse and Stepper Only—**Section 11.4.29.,** *CCB Set Point Screen 1 (Liquid Pulse and Stepper Only)*
   - CPC Suction Stepper Only—**Section 11.4.30.,** *CCB Set Points Screen 1 (CPC Suction Stepper Only)*
   - Hussmann Suction Stepper Only—**Section 11.4.31.,** *CCB Set Points Screen 1 (Hussmann Suction Stepper Only)*
2. Define CCB Set Points Screen 2
   - Liquid Pulse and Stepper Only—**Section 11.4.32.,** *CCB Set Point Screen 2 (Liquid Pulse and Stepper Only)*
   - Suction Stepper Only—**Section 11.4.33.,** *CCB Set Points Screen 2 (Suction Stepper Only)*
3. Define CCB Set Points Screen 3
   - Liquid Pulse and Stepper Only—**Section 11.4.34.,** *CCB Set Point Screen 3 (Liquid Pulse and Stepper Only)*
   - Suction Stepper Only—**Section 11.4.35.,** *CCB Set Points Screen 3 (Suction Stepper Only)*
4. Define CCB Set Points Screen 4
   - Liquid Pulse and Stepper Only—**Section 11.4.37.,** *CCB Set Points Screen 4 (CPC Suction Stepper Only)*
   - Stepper Only—**Section 11.4.38.,** *CCB Stepper Set Points Screen (Stepper Only)*

10.6. Setup Sensors

1. Define Sensors—**Section 11.5.1.,** *Setup*
2. Define Sensor Setpoints
   - All Sensor Types Except IRLDS and Linear—**Section 11.5.2.,** *Set Points (all sensor types except IRLDS and Linear)*
   - Linear Sensor Types—**Section 11.5.3.,** *Set Points (for Linear sensor types only)*
   - IRLDS Sensor Types—**Section 11.5.4.,** *Set Points (for IRLDS sensor type only)*

11 System Setup

Section 11, *System Setup*, provides a system description for every screen programmed in the RMCC. With over 150 accessible screens, navigation through the RMCC can be complex. The following descriptions provide information necessary to access any screen, what data entries are required, how those data are entered, what data ranges are acceptable for each field, and any default settings when applicable. The screens and instructions were prepared for RMCC software versions 2.0 and above; therefore, some of these instructions may not apply to earlier software versions.

An overall layout of the RMCC screens is provided in the foldouts in this section.

To help ease the use of this section, the general layout of the section and the icons used are described below.

Page Layout

A main heading entry is provided for each screen found in the RMCC. For Menu Screens such as the Main or Pressure Control menu screens, the screen graphic is accompanied by a quick reference table that provides page numbers for the options listed at that menu screen.

In addition to the screen graphic, key graphics are provided that show the exact key sequence necessary to access a particular screen. Although most of these buttons are self-explanatory, several require further discussion.

- *Data Entry*. The Data Entry button means that data, such as circuit numbers, may be required before pressing the

button. These data vary from screen to screen and a description of the data is provided when necessary.

- *Follow-On Keystroke*. When a subscripted number appears next to a key graphic, it means that the key should be pressed that number of times to reach the desired screen. In some instances, a subscripted number may be followed by a + symbol:

. This means that the key may need to be pressed an additional time to reach the desired screen.

Help Prompt Lines

Most RMCC screens contain a help prompt line at the bottom of the screen that provides the user with information about navigation and field data ranges. Within this section, the help prompt line shown is always the line that is displayed when the cursor is off the screen. Generally, the prompt line changes when the cursor is moved to a data entry field. For information on what data are displayed see Section Data Ranges and Default Settings below.

Data Fields

Data fields where entry is required by the RMCC user are shaded on the screen graphics.

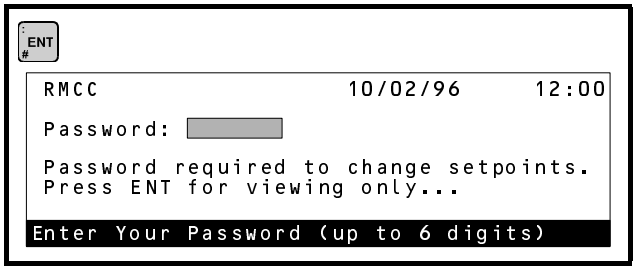
Data Ranges and Default Settings

Data ranges for data fields—the information supplied in the help prompt lines—are displayed in brackets and bold type **[-99° - 99°]** either at the heading for the particular field description, or—when a heading does not exist—within the body of the description. Suggested or default values for a particular entry are always shown in brackets and bold type immediately following the data range **[-99° - 99°] [-15.5]**.

Alternate Screen Entries

Alternate screens are displayed for Standard and Case Control Circuit setup as well as for the multiple case control types. If a screen description does not match the screen on the RMCC front panel, ensure that the description is not for a different hardware or setup function.

11.1. Log On



The RMCC requires a password for users to log on and modify the system. This ensures security of system settings. Passwords also determine the access level of the user.

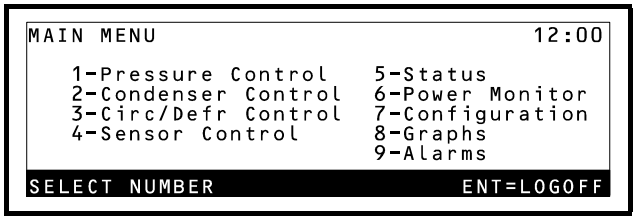
New passwords may be added to replace the default passwords at the System Information screen (see Section 11.8.3. System Information).

To view the Log On screen, press the Enter key. To log on to the system, enter the appropriate password in the Password field and press Enter. Default passwords are displayed in ***Table 11-1***.

Level	Default Password	Actions Allowed
1	100	• Manual Defrost • Acknowledge and Reset Alarms • Bypass Compressors and Fans
2	200	Level 100, plus • Adjust Set Points • Clear Alarm Logs
3	300	Level 200, plus • Perform Setup Functions
4	400	Level 300, plus • Unit Configuration • Edit System Information • Edit Communication Information

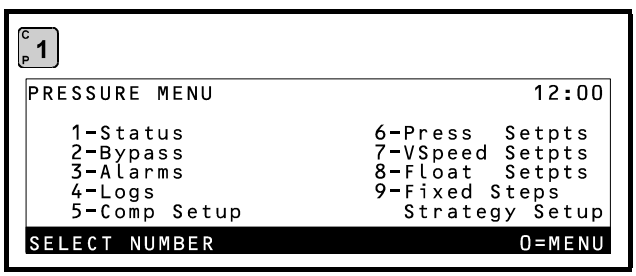
Table 11-1 *- Password Levels and Available Tasks*

11.2. Main Menu



Item	Description	Page
1	Pressure Control	11-2
2	Condenser Control	11-10
3	Circuit/Defrost Control	11-19
4	Sensor Control	11-45
5	Status	11-51
6	Power Monitoring	11-52
7	Configuration	11-52
8	Graphs	12-3
9	Alarms	14-4

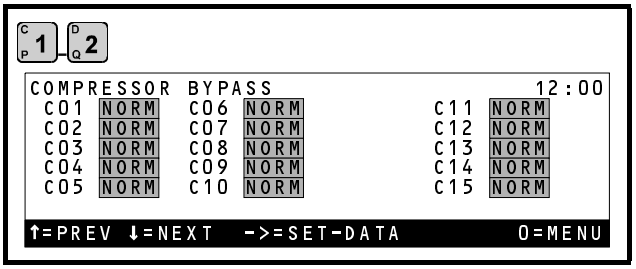
11.2.1. Pressure Control



Item	Description	Page
1	Status	13-11
2	Bypass	11-3
3	Alarms	11-5
4	Logs	12-1

Item	Description	Page
5	Compressor Setup	11-5
6	Pressure Set Points	11-6
7	Variable Speed Compressor Set Points	11-8
8	Floating Suction Set Points	11-9
9	Fixed Steps Strategy Setup	11-9

11.2.2. Bypass


COMPRESSOR BYPASS 12:00
C01 NORM C06 NORM C11 NORM
C02 NORM C07 NORM C12 NORM
C03 NORM C08 NORM C13 NORM
C04 NORM C09 NORM C14 NORM
C05 NORM C10 NORM C15 NORM
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

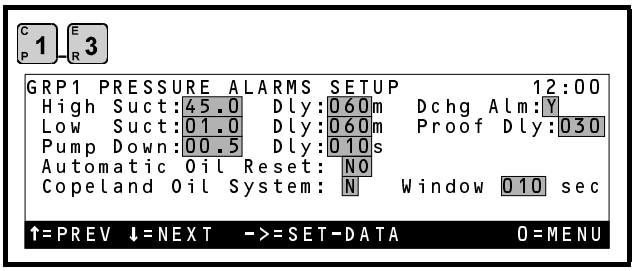
The bypass commands for compressors are retained by the RMCC even if power to the RMCC is lost.

Any compressor may be manually bypassed at the Compressor Bypass screen. The bypass overrides the system compressor settings until "N" is entered at the Compressor Bypass screen. However, in the event of phase loss, or if the high discharge trip point is reached, the compressor will be shut down regardless of the bypass condition.

The RMCC displays the compressors as defined under Output Definitions (page 54), but does not differentiate between groups.

To bypass a compressor, enter "O" (On) or "F" (Off). To return a compressor to normal operation, enter "N" for Normal.

11.2.3. Group 1 Pressure Alarms Setup


GRP1 PRESSURE ALARMS SETUP 12:00
High Suct:45.0 Dly:060m Dchg Alm:Y
Low Suct:01.0 Dly:060m Proof Dly:030
Pump Down:00.5 Dly:010s
Automatic Oil Reset: NO
Copeland Oil System: N Window 010 sec
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

The RMCC sends an alarm to the RS485 Alarm Panel and writes an alarm to the alarm log when specific control values exceed HI and LO alarm set points. Compressor alarm set points are defined at the Group 1-4 Pressure Alarms Setup screens. The Group 2, 3, and 4 screens are accessed by pressing the down arrow.

High Suct [-20 - 999 lb.] [45.0]

The RMCC will generate an alarm when the measured suction pressure rises to the High Suction Pressure set point.

Dly [0 - 240 minutes] [60]

The High Suction Time Delay is the duration the RMCC must wait before generating an alarm when the High Suction set point is reached.

Dchg Alm [(Y)es, (N)o] [Y]

The Discharge Alarm is generated when the Discharge Pressure Trip Point is met. The Discharge Pressure Trip Point is defined at the Group 1-4 Pressure Set Points screens (see 7).

Low Suct [-20 - 999 lb.] [1.0]

When the measured suction pressure equals the Low Suction Pressure set point, the RMCC will generate an alarm.

Dly [0 - 240 minutes] [60]

The Low Suction Time Delay is the duration the RMCC must wait before generating an alarm when the Low Suction Pressure set point is met.

Proof Dly [0 - 240 seconds] [30]

If a compressor proof has been defined for any compressor, the RMCC may be configured to issue an alarm if a proof signal closure is not received after a specified duration following a call for a compressor stage to activate. The RMCC will generate a run-proof failure alarm while continuing to call for the compressor. The RMCC will also display "FAIL" in the Proof field of the Pressure Control Status screen (**Section 13.9.2.,** *Suction Group Status*).

Pump Down [-20 - 999 lb.] [0.5]

The Pump Down alarm has a default setting of 0.5 lb. Changing the set point to zero does not disable the Pump Down alarm. The Pump Down alarm must be disabled by placing a "D" in the pump down field of the Pressure Alarms/Notices Setup screen (*Section 11.2.4. Pressure Alarms/Notices Setup*).

The RMCC will generate an alarm and shut down all compressors when the measured suction pressure falls to a specified Pump Down set point. Compressors will remain shut down until the suction pressure rises to the Suction Pressure Set Point defined at the Group 1-4 Pressure Set Points screens (see Section 11.2.10. Group 1 Pressure Set Points). Define the Pump Down Suction Pressure set point in the Pump Down field.

Dly [0 - 240 seconds] [10]

The Pump Down Delay is the specified duration the measured suction pressure must remain below the Pump Down set point before the RMCC will generate an alarm.

Automatic Oil Reset [(Y)es, (N)o] [N]

In screw compressor applications where low oil conditions are common, it may be advantageous to provide an automatic reset whenever a low oil condition is recognized through a digital sensor closure. When a low oil condition occurs, the associated compressor will be shut down for 20 seconds. After 20 seconds, the RMCC will read the digital sensor relay again. If the low oil condition remains, the associated compressor will be turned on for 20 seconds. The RMCC will run this oil pressure safety cycle three times. On the third low oil pressure occurrence, the RMCC yields alarm and safety control to the mechanical safety device installed on the compressor and turns the compressor off.

If at any time during the pressure safety cycle the RMCC finds normal oil pressure, the associated compressor will return to normal operation.

Copeland Oil System [(Y)es, (N)o] [N]

Enabling the Copeland Oil System for a compressor group disables Oil Sensor monitoring that may be set up for individual compressors (see Section 11.2.7., Group 1 Setup).

The Copeland Oil System allows the RMCC to take samples of oil input from a compressor and determine low oil levels by building a percentage of good versus bad readings.

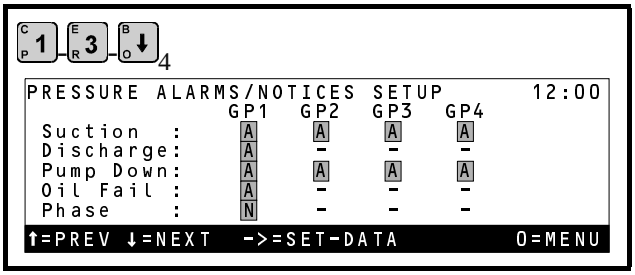
The Copeland Oil System takes a number of pressure readings during a user-defined time window **[0 - 120 sec.]**. If during this window the oil readings are 100% good, the compressor operates as normal. If the readings are below 100% good, the RMCC sets up a "time-out period," the length of which is dependent on the percentage value (lower percentages generate a smaller time-out period than higher percentages). If the percentage of bad oil readings continues throughout the length of the time-out period, the compressor will bypass OFF and an alarm will be written to the RMCC Alarm Log. ***Table 11-2*** shows the percentages and their corresponding time-out periods

If the percentage of good readings changes during a time-out, the time-out period will change, and the percentage of time elapsed will be applied to the new time-out period. For example, if a compressor had 60% good readings, the time-out period would be twelve minutes. Six minutes into the time period, the percentage of good readings drops to 30%. This immediately changes the time-out period from 12 minutes to 5 minutes. Since six of the twelve minutes in the previous time-out period (i.e. 50% of the time) had already passed, the RMCC continues with the new time-out period as if 2.5 minutes (50% of the new period) has already elapsed.

Percentage	Time-Out Period (approx.)
0%	2 min.
10%	3 min.
20%	3.5 min.
30%	5 min.
40%	6.5 min.
50%	9.5 min.
60%	12 min.
70%	16.5 min.
80%	22 min.
90%	30 min.
≈100%	40 min.

Table 11-2 *- Copeland Oil Time-Out Periods vs. Percentages*

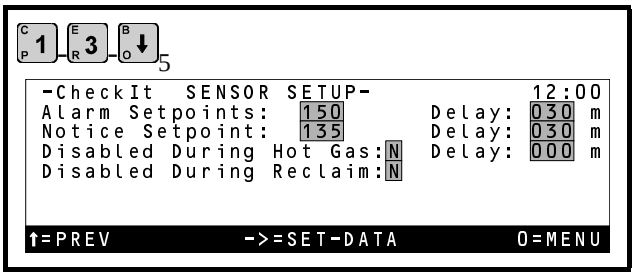
11.2.4. Pressure Alarms/Notices Setup


CP 1 - ER 3 - BO ↓ 4
PRESSURE ALARMS/NOTICES SETUP 12:00
GP1 GP2 GP3 GP4
Suction : A A A A
Discharge: A - - -
Pump Down: A A A A
Oil Fail : A - - -
Phase : N - - -
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

The RMCC may be configured to generate either an alarm or notice when user-defined Alarm set point conditions are met. An alarm is a high-level warning that indicates abnormal system conditions. An alarm is always sent to the RS485 Alarm Panel and to the Alarm Log. A notice is a low-level warning that also indicates abnormal system conditions. A notice is sent to the Alarm Log and may be sent to the 485 Alarm Panel if the RMCC is configured to do so.

To specify which type of alarm is to be generated when alarm conditions are met, select the desired alarm type for each suction group at the Pressure Alarms/Notices Setup screen. Different alarm types may be selected for different groups as well as for different types of alarm conditions. The Pump Down alarm feature defined at the Pressure Alarms Setup screen (see Section 11.2.3. Group 1 Pressure Alarms Setup) may also be disabled at this screen.

11.2.5. Checkit Sensor Setup


CP 1 - ER 3 - BO ↓ 5
-CheckIt SENSOR SETUP- 12:00
Alarm Setpoints: 150 Delay: 030 m
Notice Setpoint: 135 Delay: 030 m
Disabled During Hot Gas: N Delay: 000 m
Disabled During Reclaim: N
↑=PREV ->=SET-DATA 0=MENU

If a Checkit sensor is defined as an input at the Input Definitions screen (see Section 11.8.1. Input Definitions), the RMCC may be configured to generate an alarm when the input senses a low liquid level within the system at the Checkit Sensor Setup screen.

Alarm Setpoint/Notice Setpoint [0 - 240] [150/135]

The Checkit sensor continuously monitors the refrigeration system for a temperature increase indicating low liquid levels within the system. The RMCC may be configured to generate an alarm and/or a notice when the measured Checkit temperature rises to a defined value.

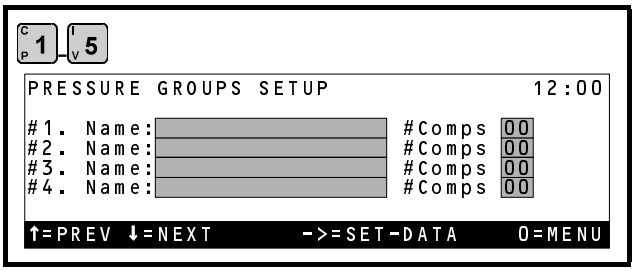
The value at which an alarm will be generated is defined in the Alarm Setpoint field. The value at which a notice will be generated is defined in the Notice Setpoint field. Delays are defined for alarms **[0 - 240 minutes] [30]** and for notices **[0 - 240 minutes] [30]** in the Delay fields.

Disabled During Hot Gas/Disabled During Reclaim [(Y)es, (N)o] [N]

The Checkit sensor monitors the system for all temperature increases, regardless of cause. Therefore, Checkit may detect normal flash gas occurrences as a result of hot gas defrosts or heat reclamation.

When the Checkit sensor is disabled during Hot Gas defrost, the RMCC must wait a specified amount of time after the completion of the defrost before accurate measurements of the liquid level can be made.

11.2.6. Compressor Setup



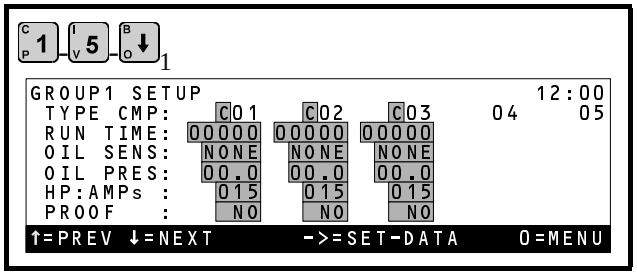
The RMCC is capable of simultaneously controlling up to four compressor groups with a total of 16 compressor stages designated for any single group when using standard control. However, no more than 22 compressor stages may be defined for a single RMCC. When using the Fixed Step Strategy activated at the Group 1-4 Pressure Set Point screen (see Section 11.2.10. Group 1 Pressure Set Points), up to 10 compressors may be assigned to a suction group.

To establish a suction pressure group, enter the desired name in the Name field. Each pressure group name may be no more than 15 characters long. The number of compressors within the defined group is entered in the # Comps field. The RMCC is capable of simultaneously controlling up to 16 compressor stages designated within any single

group. However, no more than 22 compressor stages may be defined for a single RMCC.

Each compressor group may contain a single variable speed compressor, and the RMCC is capable of controlling multiple stages of unloading within each group.

11.2.7. Group 1 Setup


C P 1
I V 5
B O
1
GROUP1 SETUP 12:00
TYPE CMP: C01 C02 C03 04 05
RUN TIME: 00000 00000 00000
OIL SENS: NONE NONE NONE
OIL PRES: 00.0 00.0 00.0
HP:AMPs : 015 015 015
PROOF : NO NO NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

After suction pressure groups are defined at the Pressure Groups Setup screen (see Section 11.2.6. Compressor Setup), the compressors within each group are defined and/or edited at the Group 1 Setup screen (use the down arrow to access the Group 2, 3, and 4 setup screens).

Type CMP [(C)omp, (V)S or (U)nldr, (X) Clear] [C]

Compressor stages are defined in the Type CMP fields. A variable speed compressor "V" may be defined as the first stage in each compressor group. An unloader "U" may be defined for any stage immediately following a compressor stage "C". Unused stages within a group should always be cleared "X".

Run Time [(0) Clear Runtime]

The Run Time field displays the total hours of operation for the selected compressor stage.

Oil Sens [(P)ress, (C)lsd, (O)pen, (N)one] [N]

An Oil monitoring sensor is defined in the Oil Sens field. If the compressor is equipped with an oil sensor, it may be defined as either a pressure transducer or a contact. If a pressure transducer is indicated, the RMCC will terminate compressor stages when the net oil pressure read by the transducer rises to the Oil Pressure set point defined in the Oil Pres field. If a contact is indicated, the RMCC monitors the system for a contact change of state from a generic mechanical oil sensor switch and terminates the compressor stage. If the compressor is not equipped with an oil sensor, select N (default) for None in the Oil Sens field.

Oil Pres [0 - 999] [15]

If the oil sensor is defined as a pressure transducer in the Oil Sens field, the net oil pressure that will cause the compressor to terminate must be defined in the Oil Pres field. This value is determined by the compressor manufacturer. The RMCC calculates the net oil pressure based on the actual oil pressure reading of the transducer minus the suction pressure reading.

HP:AMPs [0 - 999] [15]

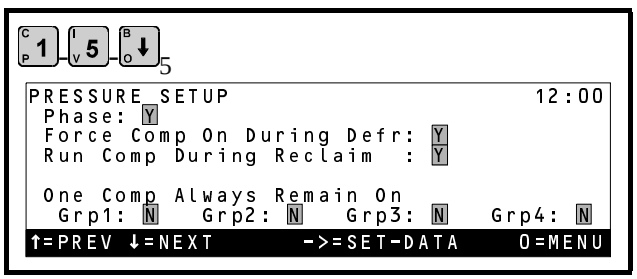
The RMCC will only accept horsepower in whole number increments. Round all fractional horsepower to the nearest whole number.

Enter the Horse Power or BTU rating of the selected compressor in the HP:AMPs field. If using a Hussmann PROTOCOL® system with the advanced defrost option, enter the amperage of the selected compressor in the HP:AMPs field. Make sure that either all compressors are defined in HP or all compressors are defined in amps.

Proof [(Y)es, (N)o] [N]

If a compressor proof input has been defined for the selected compressor stage at the Input Definitions screens (see Section 11.8.1. Input Definitions), the RMCC must be configured to look for a contact closure indicating the activation of the compressor or unloader.

11.2.8. Pressure Setup



Phase loss monitoring and special situation compressor activation for all suction groups are defined at the Pressure Setup screen.

Phase [(Y)es, (N)o] [Y]

The RMCC is designed to monitor a phase loss device (non-voltage contact closure). When phase loss is detected, the RMCC will shut down all compressors. A phase loss device must be setup at the Input Definitions screens. See Section 11.8.1. Input Definitions.

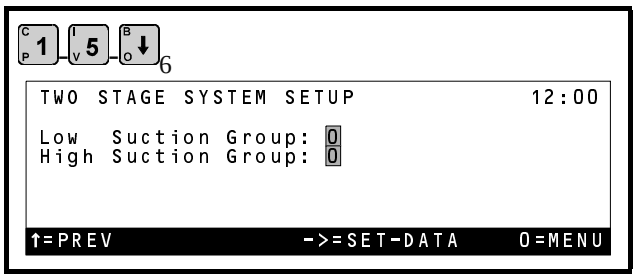
Force Comp On During Defr/Run Comp During Reclaim [(Y)es, (N)o] [Y]

When suction pressure within a group has been satisfied, the RMCC will terminate all compressor stages. A single compressor may be forced on during hot gas defrost and/or during reclaim when all compressors are terminated.

One Comp Always Remain On [(Y)es, (N)o] [N]

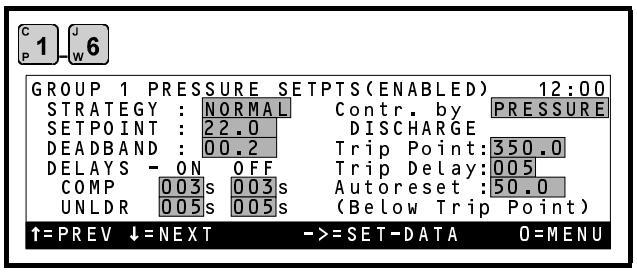
To ensure one compressor is always on within a selected suction group regardless of the suction pressure reading, select "Y" (Yes) in the appropriate Grp fields.

11.2.9. Two Stage System Setup



When a two stage rack is to be controlled, the user must specify which pressure suction group is high, and which is low. This choice will ensure a high stage compressor is running when the low stage is running **[1 - 4 Group Number, (0) Disable] [0]**. Group numbers are determined at the Pressure Groups Setup screen (see Section 11.2.6. Compressor Setup).

11.2.10.Group 1 Pressure Set Points


C P 1
J W 6
GROUP 1 PRESSURE SETPTS(ENABLED) 12:00
STRATEGY : NORMAL Contr. by PRESSURE
SETPOINT : 22.0 DISCHARGE
DEADBAND : 00.2 Trip Point:350.0
DELAYS - ON OFF Trip Delay:005
COMP 003s 003s Autoreset :50.0
UNLDR 005s 005s (Below Trip Point)
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Set points for compressor operation are established at the Pressure Setpoints screens. Each compressor pressure group must be defined separately at these screens. Screens for Group 2, 3, and 4 are accessed by pressing the down arrow.

Strategy [(N)ormal, (F)ixed Steps] [N]

The compressor strategy determines the cycling of compressors to maintain the appropriate suction pressure. A complete overview of these strategies may be found in **Section 3, *Software Overview***. Users may choose from the following strategies:

- *Normal* - the RMCC cycles compressors to maintain suction pressure based on HP/Amps defined at the Group 1-4 Setup screens (see Section 11.2.7. Group 1 Setup) using PID control algorithms.
- *Fixed Steps* - the RMCC cycles compressors to maintain suction pressure based the sequence of operation defined by the user at the Fixed Steps Strategy Setup screens (see Section 11.2.13. Group 1 Strategy Setup).

Contr. by [(T)emperature, (P)ressure] [P]

Select "T"emperature or "P"ressure to determine the method by which the RMCC will control the suction group in the Contr. by field.

Setpoint [-999 - 999] [22.0]

The Suction Pressure set point establishes the pressure or temperature the compressors within the suction group will maintain during normal operation.

Deadband [0 - 99] [0.2]

The dead band is the value equally above and below the set point within which the pressure or temperature level is considered to be acceptable. This value should be based on the suction set point to reduce short-cycling of the compressors.

Delays

Changing the compressor delays affects how quickly changes determined by the PID algorithm are used to control the compressors and unloaders. It is recommended that the delays be set to the default values (3 and 3 for the compressor, and 5 and 5 for the unloader).

Time delays are specified measurements of time the RMCC must wait before activating or deactivating system components when a command is received for activation or deactivation.

Comp [0 - 240 seconds] [3]

The Comp Delay is the duration—in seconds—the compressors will remain off or continue to run when a command is received from the RMCC.

Unldr [0 - 240 seconds] [5]

The Unldr Delay is the duration—in seconds—the unloader will delay before turning on or turning off depending on the current operation.

Discharge

Trip Point [5 - 499 lb.] [350.0]

On rare occasions, a fan motor fails or a condenser becomes blocked, causing the discharge pressure to rise to an unacceptable level, thus endangering the entire refrigeration system. The Trip Point is the pressure at which all compressors are shut down.

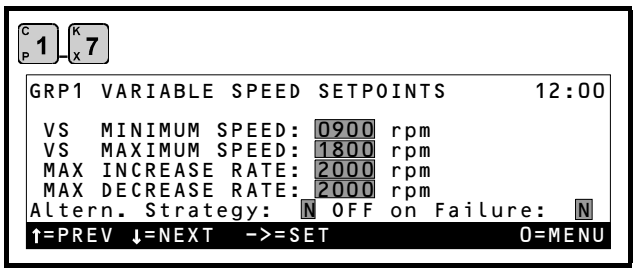
Trip Delay [0 - 240 seconds] [5]

The Trip Delay is the specified measure of time the RMCC must wait before shutting down the compressors after the Trip Point is reached.

Autoreset [2 - 99 lb.] [50.0]

After the trip point has been reached and the RMCC has shut down all compressors, the compressors are automatically reset when the discharge pressure falls to an acceptable level. This reduction in pressure is defined in the Autoreset field. This value must be lower than the Trip Point. Therefore, if the trip point is set to 350 pounds and the autoreset value is 50 pounds, the compressors will reset at 300 pounds.

11.2.11.Group 1 Variable Speed Set Points


C P 1
K X 7
GRP1 VARIABLE SPEED SETPOINTS 12:00
VS MINIMUM SPEED: 0900 rpm
VS MAXIMUM SPEED: 1800 rpm
MAX INCREASE RATE: 2000 rpm
MAX DECREASE RATE: 2000 rpm
Altern. Strategy: N OFF on Failure: N
↑=PREV ↓=NEXT ->=SET 0=MENU

All set points for variable speed compressor operation are established in the Variable Speed Setpoints screens. The default settings are appropriate for most common compressors. To verify variable speed set points, refer to the compressor user's manual. Screens for Groups 2, 3, and 4 are accessed by pressing the down arrow.

VS Minimum Speed [0 - 9999] [0900]

The VS Minimum Speed is the minimum rated speed at which the compressor may operate.

VS Maximum Speed [0 - 9999] [1800]

The VS Maximum Speed is the maximum rated speed at which the compressor may operate.

Max Increase Rate [0 - 9999] [2000]

The Maximum Increase Rate is the maximum rate at which the speed of the compressor may be increased.

Max Decrease Rate [0 - 9999] [2000]

The Maximum Decrease Rate is the maximum rate at which the speed of the compressor may be decreased.

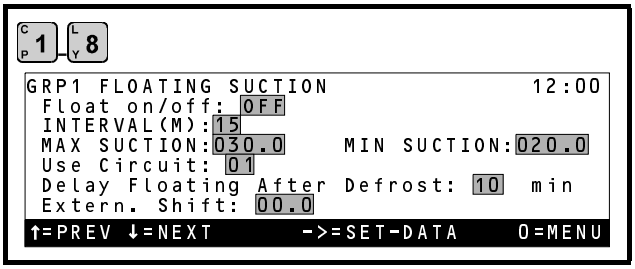
Altern. Strategy [(Y)es, (N)o] [N]

Normal compressor operation dictates that a variable speed compressor be the first compressor on and the last compressor off in a compressor group. Users may define an alternative strategy to bring on whichever compressor is most closely matched to the current system suction pressure demanded by entering "Y" for Yes in the Altern. Strategy field.

Off on Failure [(Y)es, (N)o] [N]

The Off on Failure feature allows the user to define the compressor status when an inverter failure is detected within the system. When an inverter failure is detected by the inverter alarm input defined at the Input Definitions screens (see Section 11.8.1. Input Definitions), the RMCC will attempt to reset the inverter three times. Note that for the RMCC to reset the failed inverter, an output must be defined as an inverter reset at the Output Definitions screens (see Section 11.8.2. Output Definitions). After the third attempt to reset the inverter, the compressor will bypass Off if the Off on Failure feature is activated. If the Off on Failure feature is not active, the compressor will bypass On.

11.2.12.Group 1 Floating Suction



The Floating Set Point Strategy operates the compressor system at the highest possible suction pressure while maintaining proper temperatures in the controlled cases and coolers. This strategy adjusts suction pressure settings as long as temperature conditions are acceptable. Floating Set Point Strategy settings are defined at the Group 1 Floating Suction screens. Screens for Group 2, 3, and 4 are accessed by pressing the down arrow.

Float On/Off [(O)n, O(f)f] [F]

The Floating Set Point Strategy is activated in the Float On/Off field.

Interval [0 - 60 minutes] [15]

The Interval is the duration the current circuit temperature must be above or below the Circuit Temperature set point before a one pound adjustment is made to the suction pressure. When the current circuit temperature reading is below the defined Circuit Temperature set point defined at the Circuit Setpoints screen (see Section 11.4.28. Circuit Set Points) for the defined Float Interval, the Suction Pressure set point is raised one pound. When the current circuit temperature reading is above the defined Circuit Temperature set point for the defined Float Interval, the Suction Pressure set point is lowered one pound. The interval counter is reset anytime the current circuit temperature is within the circuit temperature set point range.

Max Suction [-20 - 99 lb.] [30.0]

The Maximum Suction is the highest pressure the Suction set point may be adjusted to when the Floating Strategy is enabled.

Min Suction [-20 - 99 lb.] [20.0]

The Minimum Suction is the lowest pressure the Suction set point may be adjusted to when the Floating Strategy is enabled.

Use Circuit [0 - 48] [1]

The RMCC monitors a specified circuit temperature when utilizing the Floating Set Point Strategy. To define the circuit to monitor for the selected suction group, enter the appropriate circuit number in the Use Circuit field.

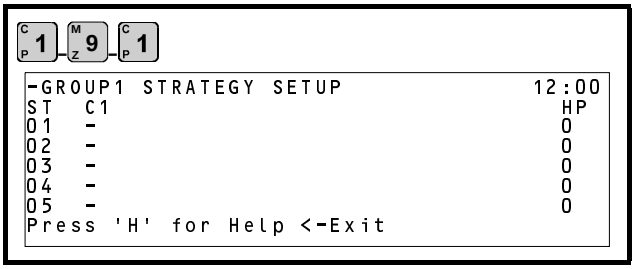
Delay Floating After Defrost [0 - 60 minutes] [10]

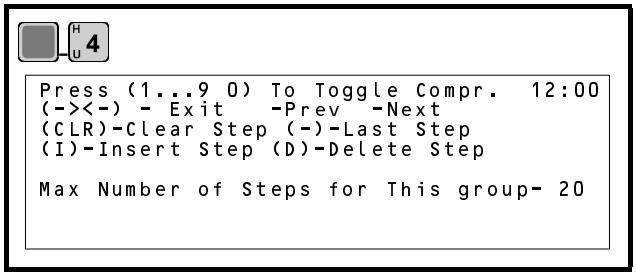
During defrost, the circuit temperature is not an accurate reading for the Floating Set Point Strategy; therefore, the strategy is disabled during defrost. After defrost, there is a period of time that the system must wait before reactivating the Floating Set Point Strategy. This duration is the Floating After Defrost Delay and is defined in the Delay Floating After Defrost field.

Extern. Shift [-99 - 99] [0]

In certain instances, users may wish to increase suction pressure during hours when refrigeration demand is greatly reduced. This shift to the Suction set point is achieved by entering a value in the External Shift field. On a contact closure (defined as a sensor input under Input Definitions, Section 11.8.1. Input Definitions), the RMCC adds the External Shift value to the Suction Pressure set point and controls compressor operation based on the new increased value.

11.2.13.Group 1 Strategy Setup




H U 4
Press (1...9 0) To Toggle Compr. 12:00
(-><-) - Exit -Prev -Next
(CLR)-Clear Step (-)-Last Step
(I)-Insert Step (D)-Delete Step
Max Number of Steps for This group- 20

When the Fixed Step Strategy is activated at the Group Pressure Set Points screen (see Section 11.2.10. Group 1

Pressure Set Points), the RMCC cycles compressors within the selected group according to a sequence of operation defined by the user at the Fixed Step Strategy Set Up screens. Each suction group may have its own strategy. Options for defining this sequence of operation for each suction group are displayed in the Fixed Steps Strategy Menu.

The Fixed Step Strategy for each suction group is configured at the Group 1 - 4 Strategy Setup screens. The Fixed Step Strategy must be defined at the Group 1 - 4 Pressure Set Points screens (see Section 11.2.10. Group 1 Pressure Set Points) for the RMCC to cycle the compressors according to the strategy configured at the Strategy Setup screens.

Displayed across the top of the screen are the defined compressors and unloaders within the suction group. Displayed down the left-hand side of the screen are all of the possible stages the group may have according to the available combinations of compressors and unloaders. This calculated amount is also displayed in the Max Number of Steps for This group field at the Help Screen.

It is recommended that all compressors be configured OFF in the first stage of the strategy. For the remaining stages, select the appropriate compressors or unloaders to be activated by entering their appropriate compressor or unloader number in the stage fields.

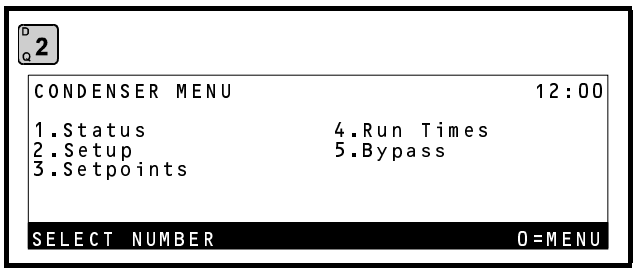
The RMCC will activate the stages when the suction pressure is above the suction pressure set point. The RMCC will cycle through the defined stages until the pressure falls to the set point. When the suction pressure set point is met, the RMCC will cycle backwards through the defined stages until the first stage of the cycle is complete, or until the suction pressure rises above the suction pressure set point. When a stage is activated or deactivated, the RMCC will wait the defined ON or OFF delay defined for compressors and unloaders at the Groups 1-4 Pressure Set Points screen before activating or deactivating the stage.

A dash must be inserted after the last step or the RMCC will assume all unused stages are configured and should be off.

Stages not defined are configured by default as all compressors OFF because no compressors or unloaders are selected for the stage. Therefore, after the last stage is defined, enter a dash "-" to indicate that the defined step is the last step in the cycle.

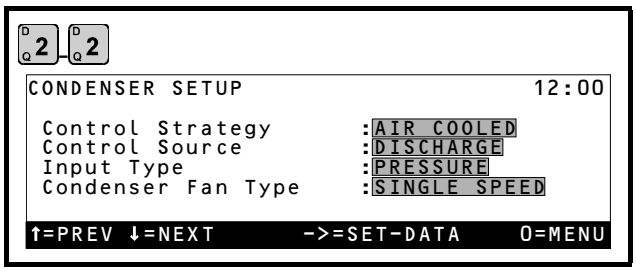
The total combined horsepower for each defined cycle is automatically calculated by the RMCC and displayed in the HP field.

11.3. Condenser Control



Item	Description	Page
1	Status	13-2
2	Condenser Setup	11-10
3	Condenser Set Points	11-16
4	Condenser Fan Run Times	11-18
5	Condenser Fan Bypass	11-19

11.3.1. Condenser Setup



Condenser characteristics that determine the operation of the fans during normal, split, and fast recovery modes are specified in the Condenser Setup screens. The first Condenser Setup screen is where the condenser's control strategy, input types and locations, and fan types are specified. The content of the setup screens that follow the first screen are largely dependent upon the Control Strategy and Condenser Fan Type settings chosen in the first screen.

The condenser fans are set up at the Output Definitions screen (see Section 11.8.2. Output Definitions).

Control Strategy [(A)ir Cooled, (T)emp Diff, (E)vaporative] [A]

The method of determining the control value used by the condenser's PID control algorithm is specified in the

Control Strategy field. There are three strategies to choose from:

- *Air Cooled* - The control value is read directly from the control source chosen in the Control Source field (see below).
- *Temp Diff* - The RMCC takes a pressure value from the control source chosen in the Control Source field (see below) and converts this pressure value to a temperature value based on the selected Refrigerant Type (see below).
- *Evaporative* - The RMCC uses a combination of pressure or temperature values from up to five sources. The method the RMCC will use to combine the values must be entered in the Control Using field (see below). Note that when this strategy is selected, "Evap Inputs" becomes locked in as the default value for the Control Source field.

Control Source [(D)ischarge, (I)nlet, (O)utlet] [D]

The temperature sensor or pressure transducer used to control the condenser fans may be mounted in either of three places: on the condenser's discharge line, on the condenser's inlet, or on the condenser's outlet. Enter the location of the sensor or transducer in this field.

Control Type [(T)emperature, (P)ressure] [P]

Condenser fans are controlled by either temperature or pressure. This control type is defined in the Control Type field. The method entered in this field will determine the units used when defining condenser set points (see "Setpoints" on Section 11.3.8. Condenser Setpoints Screen 1).

Condenser Fan(s) Type [(S)ingle Speed, (D)ouble Speed, (V)ariable Speed] [S]

Condenser fans may be either single-speed, double- or two-speed, or variable-speed.

Refrigerant Type [options] [R502]

When "Temp Diff" is selected as the control strategy in the Control Strategy field, this field will become visible at the bottom of the screen. The refrigerant type used in the refrigerant system must be entered in this field. The RMCC uses the refrigerant type to determine the refrigerant temperature based on the refrigerant pressure.

Use the period "." and dash "—" keys to scroll through the possible refrigerant types. There are ten different refrigerant types to choose from:

- R22
- R401A
- R401B
- R402A
- R402B
- R408A
- R134A
- R404A
- R507
- R502

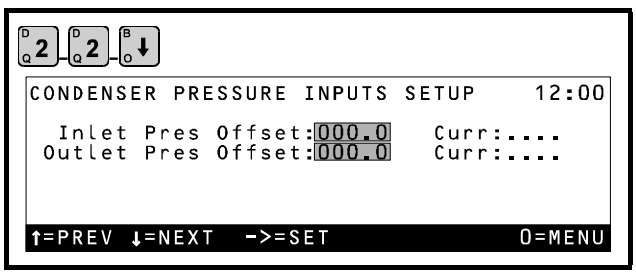
Control Using [(O)NE, (A)VG, MI(N), MA(X)] [O]

When "Evaporative" is selected as the control strategy in the Control Strategy field, this field will become visible at the bottom of the screen. The discharge pressure or temperature of an evaporative condenser may be controlled by a single temperature or pressure sensor or a combination of up to five temperature or pressure sensors. The method used to combine the multiple values into a single control value must be specified in this field. There are four different refrigerant types to choose from:

- *(O)NE* - Only one sensor will be used to determine the control value.
- *(A)VG* - The average of all sensor values will be used as the control value.
- *MI(N)* - The lowest of all sensor values will be used as the control value.
- *MA(X)* - The highest of all sensor values will be used as the control value.

Sensors for evaporative condensers must be given board and point addresses in the Input Definition screens (see Section 11.8.1. Input Definitions).

11.3.2. Condenser Pressure Inputs Setup (Air-Cooled & Temp Diff Strategies Only)



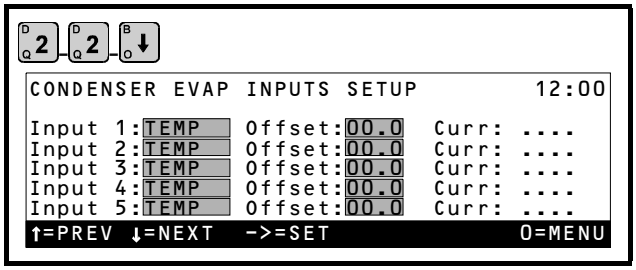
This screen is present only if the Control Strategy field in **Section 11.3.1.,** *Condenser Setup*, is set to "Air Cooled" or "Temp Diff." If the Evaporative strategy is being used, this screen is replaced with the Condenser Evaporative Inputs Screen as shown in **Section 11.3.3.**

The Condenser Pressure Inputs Setup screen allows users to enter an offset value to correct the inlet and outlet transducer values. The current transducer values are shown

in the Curr fields. Any offset value entered in the Offset fields are added to the current values **[-99 - 99] [0]**.

An offset for the discharge pressure transducer may be entered using the screen shown in **Section 11.8.12.,** *Transducer Offsets*.

11.3.3. Condenser Evaporative Inputs Setup


CONDENSER EVAP INPUTS SETUP 12:00
Input 1:TEMP Offset:00.0 Curr: ....
Input 2:TEMP Offset:00.0 Curr: ....
Input 3:TEMP Offset:00.0 Curr: ....
Input 4:TEMP Offset:00.0 Curr: ....
Input 5:TEMP Offset:00.0 Curr: ....
↑=PREV ↓=NEXT ->=SET 0=MENU

This screen is present only if the Control Strategy field in **Section 11.3.1.,** *Condenser Setup*, is set to "Evaporative." If the Air Cooled or Temp Diff strategies are being used, this screen is replaced with the Condenser Pressure Inputs Setup screen as shown in **Section 11.3.2.**

The Condenser Evaporative Inputs Setup screen allows users to specify the sensor types used for the evaporative inputs and to calibrate sensors by specifying offsets.

Input Types [options] [Temp]

The types of sensors used as evaporative inputs must be specified in the Input Type fields. There are two different sets of choices to choose from depending upon whether the Control Type field in **Section 11.3.1.,** *Condenser Setup*, is set to Temperature or Pressure:

Temperature

- *TEMP* - Standard temperature sensor.
- *6450Tm* - Margaux 6450 temperature sensor.

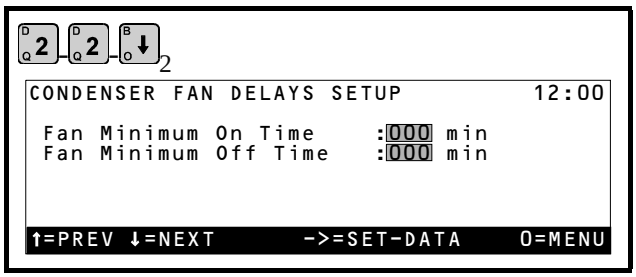
Pressure

- *100 LB* - 100 pound pressure transducer.
- *200 LB* - 200 pound pressure transducer.
- *500 LB* - 500 pound pressure transducer.

Offset [-99 - 99] [0]

Offset values may be entered in the Offset fields to correct sensor or transducer values. The current values are shown in the Curr fields. Any offset value entered in the Offset fields are added to the current values.

11.3.4. Condenser Fan Delays Setup



Fan Minimum On Time [0 - 240 min.] [0 min.]

When condenser fans activate, they must remain on for an amount of time specified in the Fan Minimum On Delay field.

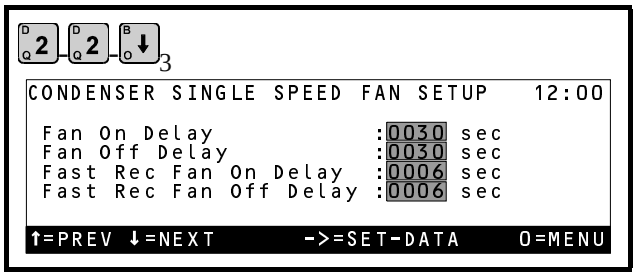
Fan Minimum Off Time [0 - 240 min.] [0 min.]

When condenser fans deactivate, they must remain off for an amount of time specified in the Fan Minimum Off Delay field.

11.3.5. Condenser Single-Speed Setup Screens

The Condenser Single-Speed Fan Setup screens are accessible only if the Condenser Fan(s) Type field is set to "Single-Speed". Double- and variable-speed setup screens are described in the Condenser Two-Speed Fan Setup and the Condenser Variable-Speed Fan Setup sections (on Section 11.3.6. Condenser Two-Speed Fan Setup and Section 11.3.7. Variable-Speed Setup Screens respectively).

11.3.5.1. Single-Speed Setup Screen 1


CONDENSER SINGLE SPEED FAN SETUP 12:00
Fan On Delay :0030 sec
Fan Off Delay :0030 sec
Fast Rec Fan On Delay :0006 sec
Fast Rec Fan Off Delay :0006 sec
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Fan On Delay [0 - 3600 sec.] [30 sec.]

Before the RMCC turns on a condenser fan, it will wait a number of seconds equal to the Fan On Delay. Enter the desired value in this field.

Fan Off Delay [0 - 3600 sec.] [30 sec.]

Before the RMCC turns off a condenser fan, it will wait a number of seconds equal to the Fan Off Delay. Enter the desired value in this field.

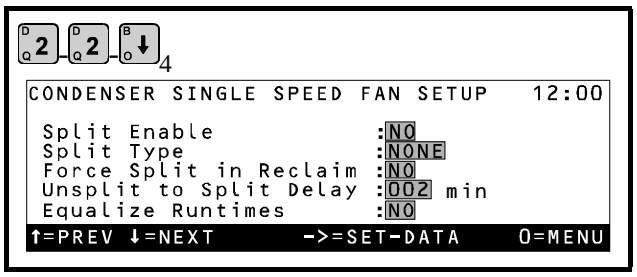
Fast Rec Fan On Delay [0 - 3600 sec.] [6 sec.]

When the condenser is switched from normal to fast recovery mode, the RMCC will wait a number of seconds equal to the Fast Rec Fan On Delay before activating all condenser fans. Enter the desired value in this field.

Fast Rec Fan Off Delay [0 - 3600 sec.] [6 sec.]

When the condenser is switched from fast recovery to normal mode, the RMCC will wait a number of seconds equal to the Fast Rec Fan Off Delay before returning the condenser to normal operation. Enter the desired value in this field.

11.3.5.2. Single-Speed Setup Screen 2


CONDENSER SINGLE SPEED FAN SETUP 12:00
Split Enable :NO
Split Type :NONE
Force Split in Reclaim :NO
Unsplit to Split Delay :002 min
Equalize Runtimes :NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Split Enable [(Y)ES, (N)O] [N]

The Condenser Split feature allows the RMCC to reduce or expand the condensing capabilities of the condenser when the outside ambient temperature is appropriate. To enable Condenser Split, enter a "Y" in this field.

Split Type [(N)ONE, (E)VEN, (O)DD, (1)ST HALF, (2)ND HALF] [N]

When the Condenser Split feature is active and the RMCC calls for the condenser fans to be split, selected fans will be disabled. These fans are chosen in the Split Fans field.

The Condenser Split feature uses the addresses of the fans' 8RO board connections. Choosing "O"dd disables all odd-numbered fan outputs (e.g. C1 FAN #01, C1 FAN #03, C1 FAN #05, etc.). Choosing "E"ven disables all even numbered fan inputs. Choosing "1"st Half disables fan inputs C1 FAN #01 through C1 FAN #06. Choosing "2"nd Half disables fan inputs C1 FAN #07 through C1 FAN #12. Choosing "N"-None leaves all fans operational on a call for a condenser split.

If "N"-None is chosen, be sure to identify an output relay at the Output Definitions screens to control operation of a condenser split valve; otherwise, regardless of any split settings defined, condenser operation will remain unchanged.

Force Split in Reclaim [(Y)ES, (N)O] [N]

To activate the split configuration when the RMCC detects a closure on the Reclaim input, enter "Y"es in the Force Split in Reclaim field.

Unsplit-Split Delay [0 - 240 minutes] [2]

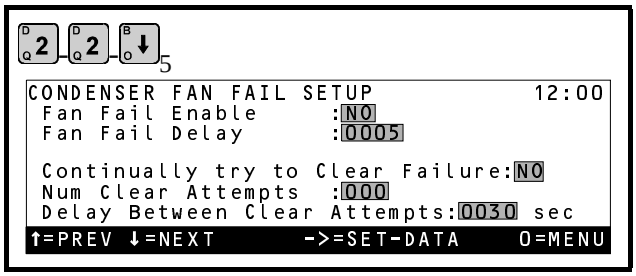
The Unsplit-Split Delay is the specified measurement of time the RMCC must wait before reactivating the split mode after reaching the Discharge Unsplit Pressure.

Equalize Runtimes [(Y)es, (N)o] [N]

The real-time clock within the RMCC records the cumulative runtimes of each condenser fan. The RMCC may be configured to select condenser fans for operation based on which fans have the fewest operational hours by selecting "Y" for Yes in the Equalize Runtimes field.

To prevent condenser damage, condenser manufacturers recommend that condenser fan cycles should be configured so that the fans closest to the condenser manifold always cycle on first. These fans will not always cycle on first when runtimes are equalized.

11.3.5.3. Condenser Fan Fail Setup


CONDENSER FAN FAIL SETUP 12:00
Fan Fail Enable :NO
Fan Fail Delay :0005
Continually try to Clear Failure:NO
Num Clear Attempts :000
Delay Between Clear Attempts:0030 sec
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Fan Fail Enable [(Y)es, (N)o] [N]

When the Fan Fail Enable field is set to YES, the RMCC will check for condenser fan failure by monitoring

the condenser fan proof inputs (see Input Definitions on Section 11.8.1. Input Definitions).

Fan Fail Delay [0 - 3600 sec.] [5 sec.]

If a fan proof indicates a fan failure for a duration equal to the Fan Fail Delay, the RMCC will consider that fan to have failed.

Continually try to Clear Failure [(Y)es, (N)o] [N]

When this field is set to YES, the RMCC will automatically attempt to clear fan proof failures. When a fan proof is closed, the RMCC attempts to clear it by turning the fan on. If the proof is successfully cleared after this attempt, the fan shuts off and condenser control reverts to normal. If the attempt is unsuccessful, the RMCC shuts off the fan. After a specified number of attempts are made to clear the fan (see below), the fan will be considered "failed" and will be bypassed OFF.

Num Clear Attempts [0 - 240] [0]

The number of clear attempts the RMCC will make before considering a fan to be failed is entered in this field.

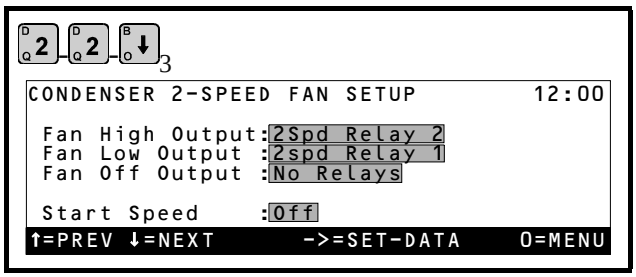
Delay Between Clear Attempts [0 - 3600 sec.] [30 sec.]

The Delay Between Clear Attempts value is the number of seconds the RMCC will wait between clear attempts.

11.3.6. Condenser Two-Speed Fan Setup

The following screens are accessible only if the Condenser Fan(s) Type field is set to "Two Speed". Single- and variable-speed setup screens are described in the Condenser Two-Speed Fan Setup and the Condenser Variable-Speed Fan Setup sections (on Section 11.3.5. Condenser Single-Speed Setup Screens and Section 11.3.7. Variable-Speed Setup Screens respectively).

11.3.6.1. Two-Speed Setup Screen 1


CONDENSER 2-SPEED FAN SETUP 12:00
Fan High Output:2Spd Relay 2
Fan Low Output :2spd Relay 1
Fan Off Output :No Relays
Start Speed :Off
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Fan High Output [(2)-2Spd Relay 2, (1)-2Spd Relay 1, (0)-Both Relays, (N)o Relays] [2]

The relay or relays chosen in the Fan High Output field are closed when the RMCC calls for high-speed output on the condenser fans. There are four options:

- *2 Spd Relay 1* - Two-speed relay #1 will be closed during high-speed operation.
- *2 Spd Relay 2 (default)* - Two-speed relay #2 will be closed during high-speed operation.
- *Both Relays* - Both two-speed relay #1 and #2 will be active during high-speed operation.
- *No Relays* - Neither relay will be closed during high-speed operation.

Relays #1 and #2 must be defined as "C1 2S REL 1" and "C1 2S REL 2" in the Output Definitions section (see Section 11.8.2. Output Definitions).

Fan Low Output [(1)-2Spd Relay 1, (2)-2Spd Relay 2, (0)-Both Relays, (N)o Relays] [1]

The relay or relays chosen in the Fan Low Output field are closed when the RMCC calls for low-speed output on the condenser fans. Options for this field are the same as for the Fan High Output field above, except the default setting is "2 Spd Relay #1".

Fan Off Output [(1)-2Spd Relay 1, (2)-2Spd Relay 2, (0)-Both Relays, (N)o Relays] [N]

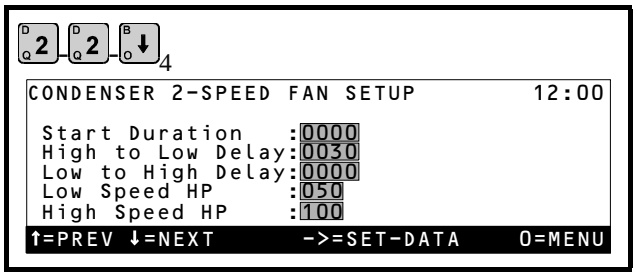
The relay or relays chosen in the Fan Off Output field are closed when the RMCC calls for the condenser fans to be turned off. Options for this field are the same as for the Fan High Output field above, except the default setting is "No Relays".

Start Speed [(O)ff, (H)igh, (L)ow] [O]

The Start Speed is the speed at which the condenser must begin to operate when activated from an OFF state. The condenser must begin operation at either Off, High, or Low speed until the defined Start Duration has passed, at which point the condenser operates at the speed required by the RMCC.

The Start Duration is defined in Two-Speed Setup Screen 2 (see below).

11.3.6.2. Two-Speed Setup Screen 2


CONDENSER 2-SPEED FAN SETUP 12:00
Start Duration :0000
High to Low Delay:0030
Low to High Delay:0000
Low Speed HP :050
High Speed HP :100
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Start Duration [0 - 3600 sec.] [0 sec.]

Before the condenser can be activated from an OFF state, it must undergo a "start duration". During this time, the condenser operates at a fixed, user-defined speed until the end of the start duration. After the start duration is complete, the condenser will operate at the speed called for by the RMCC.

The Start Speed is defined in Two-Speed Setup Screen 1 (see above).

High to Low Delay [0 - 3600 sec.] [30 sec.]

The High to Low Delay is the number of seconds the RMCC must wait before switching a condenser's fan speed from High to Low.

Low to High Delay [0 - 3600 sec.] [0 sec.]

The Low to High Delay is the number of seconds the RMCC must wait before switching a condenser's fan speed from Low to High.

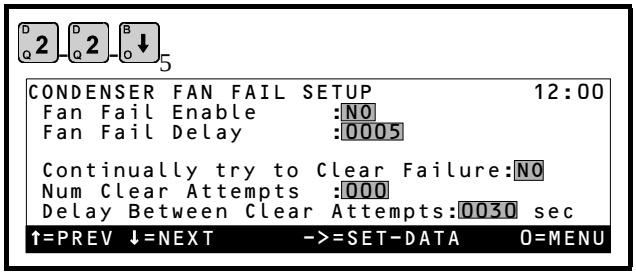
Low Speed HP [0 - 240 HP] [50 HP]

In this field, enter the horsepower of the fan (or the total horsepower, if more than one fan) that is active when the condenser is operating at low speed.

High Speed HP [0 - 240 HP] [100 HP]

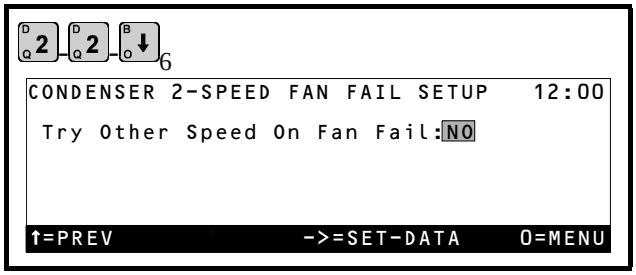
In this field, enter the horsepower of the fan (or the total horsepower, if more than one fan) that is active when the condenser is operating at high speed.

11.3.6.3. Condenser Fan Fail Setup


CONDENSER FAN FAIL SETUP 12:00
Fan Fail Enable :NO
Fan Fail Delay :0005
Continually try to Clear Failure:NO
Num Clear Attempts :000
Delay Between Clear Attempts:0030 sec
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Refer to Condenser Fan Fail Setup on Section 11.3.5.3. Condenser Fan Fail Setup.

11.3.6.4. Condenser Two-Speed Fan Fail Setup



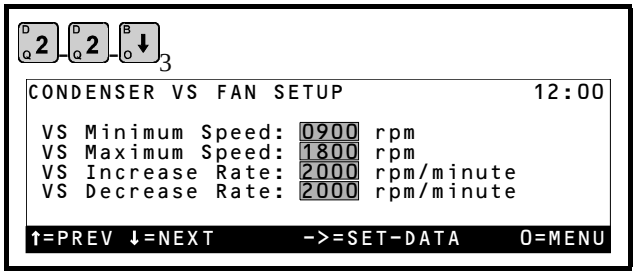
Try Other Speed On Fan Fail [(Y)es, (N)o] [N]

The Try Other Speed On Fan Fail feature allows the RMCC to compensate for a fan failure by substituting the

11.3.7. Variable-Speed Setup Screens

The following screens are accessible only if the Condenser Fan(s) Type field is set to "Variable-Speed". Single- and two-speed setup screens are described in the Condenser Single-Speed Fan Setup and the Condenser Two-Speed Fan Setup sections (on Section 11.3.5. Condenser Single-Speed Setup Screens and Section 11.3.6. Condenser Two-Speed Fan Setup, respectively).

11.3.7.1. Condenser VS Fan Setup


CONDENSER VS FAN SETUP 12:00
VS Minimum Speed: 0900 rpm
VS Maximum Speed: 1800 rpm
VS Increase Rate: 2000 rpm/minute
VS Decrease Rate: 2000 rpm/minute
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

VS Minimum Speed, VS Maximum Speed [0 - 32000 rpm] [0 rpm]

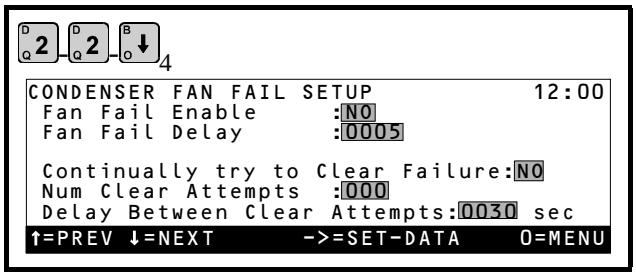
When the RMCC calls for the variable-speed condenser fans to be on at 0%, the fans will operate at the defined VS

Minimum Speed. Likewise, when the RMCC calls for the fans to be on at 100%, the fans will operate at the defined VS Maximum Speed.

VS Increase Rate, VS Decrease Rate [0 - 32000 rpm/minute] [0 rpm/minute]

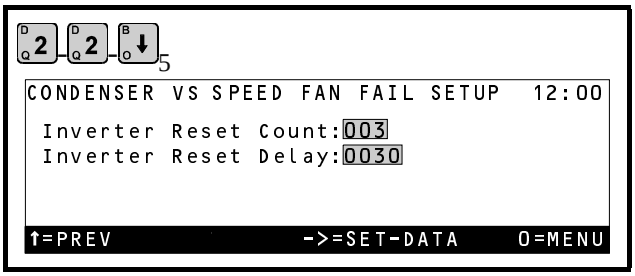
The VS Increase Rate is the maximum rate at which the speed of the condenser fan may be increased. The VS Decrease Rate is the maximum rate at which the speed of the condenser fan may be decreased.

11.3.7.2. Condenser Fan Fail Setup


D 2 D 2 B
4
CONDENSER FAN FAIL SETUP 12:00
Fan Fail Enable :NO
Fan Fail Delay :0005
Continually try to Clear Failure:NO
Num Clear Attempts :000
Delay Between Clear Attempts:0030 sec
↑=PREV ↓=NEXT ->=SET-DATA O=MENU

Refer to Condenser Fan Fail Setup on Section 11.3.5.3. Condenser Fan Fail Setup.

11.3.7.3. Condenser VS Fan Fail Setup



Inverter Reset Count [0 - 240 attempts] [3 attempts]

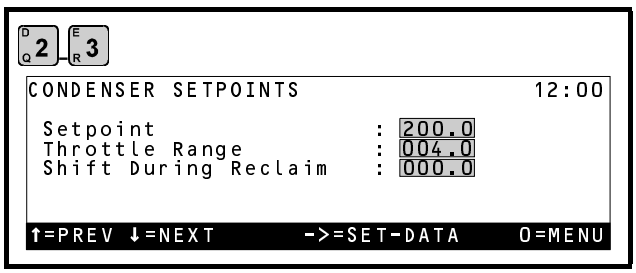
In order for the RMCC to automatically reset failed inverters, an inverter reset output must be defined in the Output Definitions screen on Section 11.8.2. Output Definitions.

When an inverter failure is detected on the condenser fans' inverter alarm input (see Input Definitions on Section 11.8.1. Input Definitions), the RMCC will attempt to reset the inverter. The Inverter Reset Count is the number of reset attempts the RMCC will make before bypassing the failed compressor off.

Inverter Reset Delay [0 - 3600 sec.] [30 sec.]

When the RMCC is set up to make multiple attempts to reset failed inverters, the Inverter Reset Delay is the number of seconds between each inverter reset attempt.

11.3.8. Condenser Setpoints Screen 1



Setpoint [-99 - 999] [200.0]

The Setpoint value is the discharge pressure or temperature (or temperature differential, as is the case with TD condensers) the RMCC will attempt to maintain during condenser control. See **Section 3.3.,** ***Condenser Control***, for more information about condenser control.

Throttle Range [0 - 99] [4.0]

The Throttle Range value forms an operational range for the condenser fans that is equally above and below the Setpoint value. See **Section 3.3.,** ***Condenser Control***, for more information about throttle ranges.

If the condenser is being controlled by pressure, be sure to set the Throttle Range to 60. At the same time, the PID Output as Setpoint should be set to 50 (set the PID Output as Setpoint on the Condenser PID Parameters screen).

Shift During Reclaim [-99 - 999] [0]

During reclaim, it may be preferable to increase the pressure at which the fans begin to operate in order to increase the temperature of the refrigerant in the system. The Shift During Reclaim set point shifts the First Fan set point pressure by the number entered. All subsequent fan set points are adjusted accordingly.

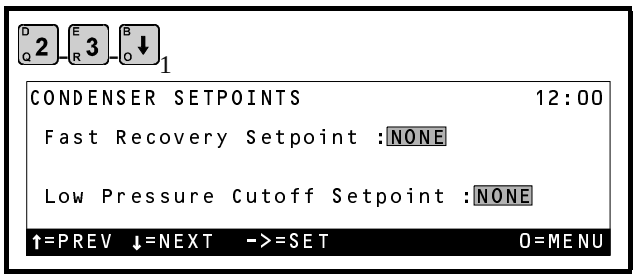
For example, if the Setpoint is 175, the Throttle Range is 25, and the Shift During Reclaim set point is 25; the first condenser fan set point will be shifted to 200 and the last condenser fan will be activated at 225 when a call for reclaim is received from an environmental control system.

Minimum Condensing Setpt (Temp Diff Strategy Only) [0 - 999] [50.0]

This field appears at the bottom of the Condenser Set Points screen only if the Temperature Differential strategy is specified in the Condenser Setup screen (see **Section 11.3.1.**).

The Minimum Condensing Setpoint is the lowest possible value of the condensing setpoint. If the ambient temperature plus the temperature differential entered in the Setpoint field (above) falls below the Minimum Condensing Setpoint, the RMCC will use the Minimum Condensing Setpoint as the control set point.

11.3.9. Condenser Setpoints Screen 2



Fast Recovery Setpoint [-99 - 999 or NONE] [NONE]

The Fast Recovery feature within the RMCC attempts to prevent the discharge pressure from reaching the Trip Point defined at the Pressure Setpoints screen (see Section 11.2.10. Group 1 Pressure Set Points). The set point entered in the Fast Recovery Setpoint field is the discharge pressure or temperature at which the RMCC bypasses the normal fan operational settings and cycles on all fans to bring the discharge pressure or temperature down to an acceptable level.

The RMCC uses a default Fast Recovery Hysteresis of 2.0. This value is subtracted from the Fast Recovery set point to determine the control input value below which the RMCC will exit recovery mode. For example, if a condenser's discharge pressure is above 300 psi when the Fast Recovery set point is 300 psi, the RMCC begins fast recovery mode. The RMCC will continue fast recovery until the discharge pressure drops below 298 psi (300 - 2.0).

Fast Recovery Control Type (Evaporative Only) [Ctl Value/Max] [Ctl Value]

This field only appears in this screen when the Control Strategy field in the Condenser Setup screen (Section 11.3.1. Condenser Setup) is set to EVAPORATIVE.

Evaporative condensers may use a combination of one or more sensor values as a control value. Some of the combination strategies used in evaporative condenser control—namely Average (AVG) and Minimum (MIN)—may not yield appropriate control values for use in Fast Recovery, because a high pressure in one sensor might have little or no effect on the control value. Since the Fast Recovery feature is designed to keep discharge pressure from going too high, it might be a better option to use the maximum sensor value as the control value for Fast Recovery.

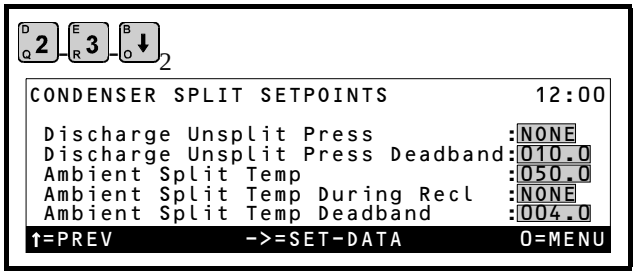
To use the highest sensor value as the Fast Recovery control value, select Max in this field. To use the same control value that is used in condenser fan control, select Ctl Value.

Low Pressure Cutoff Setpoint [-99 - 999 or NONE] [NONE]

The Low Pressure Cutoff Setpoint is the lowest condenser control input value at which the condenser control fans will be allowed to operate. If the condenser control value falls below this set point, all condenser fans will be deactivated EXCEPT those in bypass.

The RMCC uses a Low Pressure Cutoff Hysteresis default value of 2.0 to determine the control input value above which the RMCC will exit recovery mode. The Low Pressure Cutoff Hysteresis is added to the Low Pressure Cutoff Setpoint For example, if a condenser's discharge pressure is 49 psi when the Low Pressure Cutoff set point is 50, the RMCC begins Low Pressure Cutoff mode. The RMCC will continue low pressure cutoff mode until the pressure rises above 52 psi (50 + 2.0).

11.3.10.Condenser Split Setpoints


CONDENSER SPLIT SETPOINTS 12:00
Discharge Unsplit Press :NONE
Discharge Unsplit Press Deadband:010.0
Ambient Split Temp :050.0
Ambient Split Temp During Recl :NONE
Ambient Split Temp Deadband :004.0
↑=PREV ->=SET-DATA 0=MENU

Discharge Unsplit Pressure [0 - 999 lb., (N)one] [N]

In some instances, unacceptable pressure levels within the refrigeration system require that a condenser be brought out of split mode. When the discharge pressure level reaches the Discharge Unsplit Pressure Set Point, the selected condenser will be brought out of split mode and the condenser fans will return to normal operation. To activate the Discharge Unsplit Pressure feature, enter a value in pounds in the Discharge Unsplit Pressure field. A “NONE” in this field disables this feature.

Discharge Unsplit Press Deadband [0 - 50 lb.] [10]

The Discharge Unsplit Pressure Dead Band is a value equally above and below the Discharge Unsplit Pressure set point within which the pressure level in the refrigeration system is considered to be acceptable. This value ensures the condenser does not drop in and out of split mode when the discharge pressure hovers around the Discharge Unsplit Pressure set point.

Ambient Split Temp [-50 - 99°, (N)one] [50]

The Ambient Split Temperature is the temperature at which the condensing capabilities of the condenser are reduced—or split—either by limiting the number of fans that may be operated or by activating a valve which reduces the effective cooling area of the coil.

Configuration of condensers during split operation is defined at the Condenser Setup screen (see Section 11.3.1. Condenser Setup).

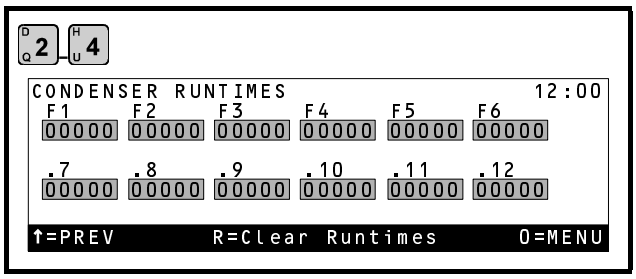
Ambient Split Temp During Reclaim [-50 - 99°, (N)one] [N]

When heat is being reclaimed, it may be desirable to have the condenser split at an ambient temperature higher than the Ambient Split Temperature set point. Degree units are determined by the unit selected at the System Units screen (see Section 11.8.7. System Units).

Ambient Split Temp Deadband [0 - 99°, (N)one] [4.0]

The dead band is a value equally above and below both the Ambient Split Temperature and the Reclaim Ambient Split Temperature set points within which the ambient outside temperature is considered to be acceptable. This value ensures the condenser does not drop in and out of split mode when the ambient outside temperature hovers around the split temperature set point. To define an ambient split temperature dead band, enter a value between 0° and 99°F in the first Dead Band field.

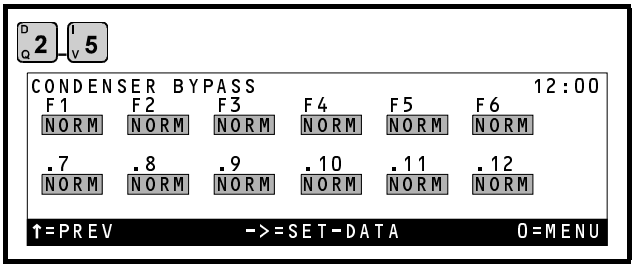
11.3.11.Run Times



The real-time clock within each RMCC records the cumulative runtimes of each condenser fan. These runtimes are displayed at the Condenser Runtimes screen. The cumulative runtime is the total number of hours each fan has been activated for the duration the RMCC has been connected or since the last clear runtimes command.

The clear runtimes command clears the cumulative runtimes for each fan. To reset the runtimes for any fan, move the cursor to the desired fan runtimes and press the blue key then the “R” key.

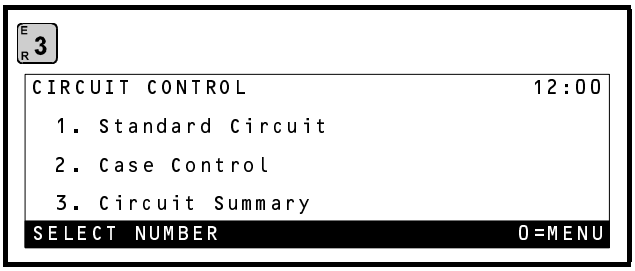
11.3.12.Bypass


2
5
CONDENSER BYPASS 12:00
F1 F2 F3 F4 F5 F6
NORM NORM NORM NORM NORM NORM
.7 .8 .9 .10 .11 .12
NORM NORM NORM NORM NORM NORM
↑=PREV ->=SET-DATA 0=MENU

Any defined condenser fan may be bypassed for a fixed duration at the Condenser Bypass screen. A fixed bypass overrides the system condenser fan settings with a user-defined ON or OFF setting until the bypass command is returned to normal at the Condenser Bypass screen.

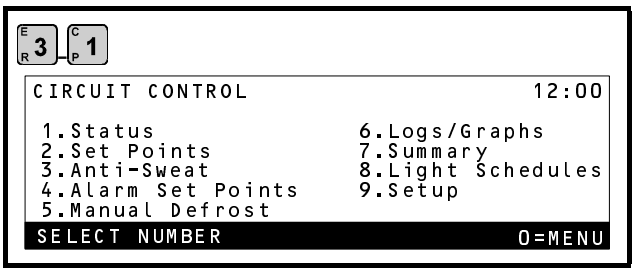
To activate a condenser bypass, specify “O”n or Of”f” for each defined condenser fan to be bypassed. To deactivate a condenser bypass, change the On or Off status to the Normal command and the selected condenser fan will resume controlling with its original settings.

11.4. Circuit Defrost Control



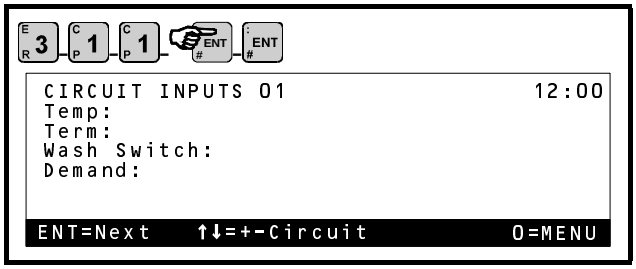
Item	Description	Page
1	Standard Circuit	11-19
2	Case Control	11-32
3	Circuit Summary	11-44

11.4.1. Standard Circuit



Item	Description	Page
1	Status	13-11
2	Circuit Set Points	11-20
3	Anti-Sweat	11-21
4	Alarm Set Points	11-23
5	Manual Defrost	11-23
6	Circuit Logs and Graphs	12-1
7	Circuit Summary	13-4
8	Light Schedules	11-24
9	Circuit Setup	11-24

11.4.2. Circuit Inputs



The Circuit Inputs Status screen displays the current status information about selected inputs defined within the selected circuit.

Temp

The current Circuit Temperature is displayed in the Temp field.

Term

If the termination sensors were set up as analog temperature sensors, the current termination temperature reading is displayed in the Term field. This field will display either OPN (open) or CLSD (closed) if the termination sensors were set up as digital sensors.

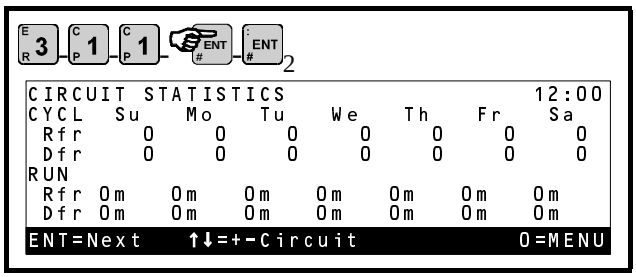
Wash Switch

The current status of the Clean Switch Input is displayed in the Wash Switch field if the switch is defined at the Circuit Setpoints 2 screen (see Section 11.4.19. Circuit Set Points 2). The field will display either OPN (open) or CLSD (closed)

Demand

The current status of the Demand Defrost Input is displayed in the Demand field if a Demand Defrost Sensor is defined at the Circuit Set Points 3 screen (see Section 11.4.20. Circuit Set Points 3). The field will display either ON or OFF.

11.4.3. Circuit Statistics


E R 3
C P 1
C P 1
ENT #
ENT #
2
CIRCUIT STATISTICS 12:00
CYCL Su Mo Tu We Th Fr Sa
Rfr 0 0 0 0 0 0 0
Dfr 0 0 0 0 0 0 0
RUN
Rfr 0m 0m 0m 0m 0m 0m 0m
Dfr 0m 0m 0m 0m 0m 0m 0m
ENT=Next ↑↓=+-Circuit O=MENU

The Circuit Statistics screen displays daily status information for both the refrigeration and defrost outputs.

Cycl

The total numbers of refrigeration and defrost cycles initiated during the past seven days are displayed in the Cycl fields.

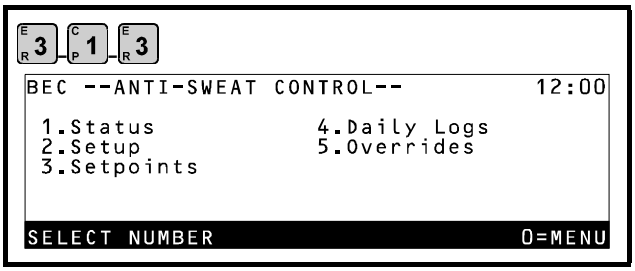
Run

The total runtimes of refrigeration and defrost cycles for the past seven days are displayed in the Run fields.

11.4.4. Circuit Set Points

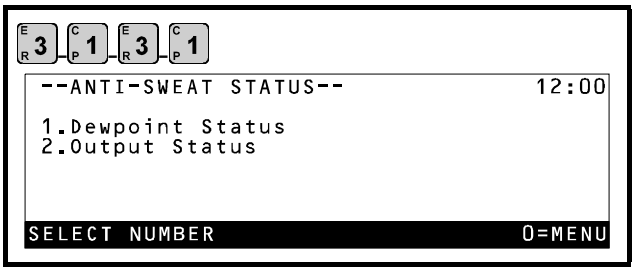
Standard Circuit Control Set Point screens are also accessed by selecting the Setup Command from the Standard Circuit Control Menu. For descriptions of these screens, see Section 11.4.18. Circuit Set Points 1 through Section 11.4.21. Circuit Set Points 4.

11.4.5. Anti-Sweat Control Menu



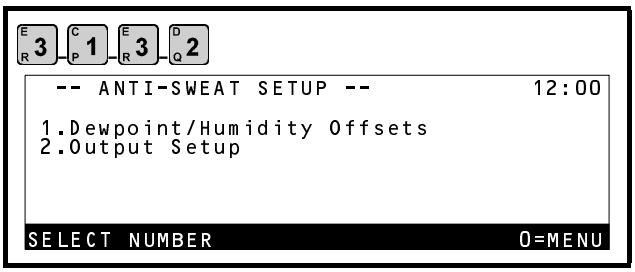
Item	Description	Page
1	Status	13-4
2	Setup	11-21
3	Setpoints	11-22
4	Daily Logs	12-1
5	Overrides	11-22

11.4.6. Anti-Sweat Status Menu



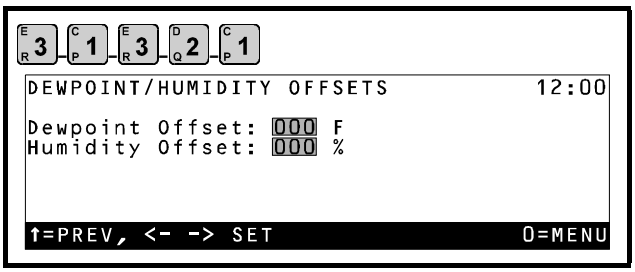
Item	Description	Page
1	Dewpoint Status	13-4
2	Output Status	13-5

11.4.7. Anti-Sweat Setup



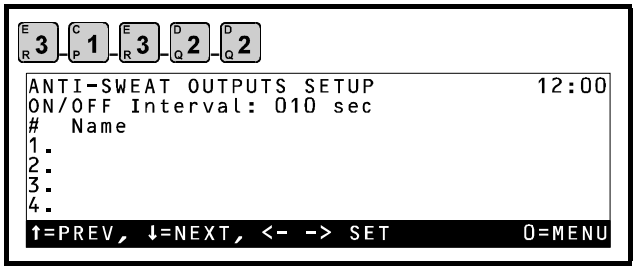
Item	Description	Page
1	Dewpoint/Humidity Offsets	11-21
2	Output Setup	11-22

11.4.8. Dewpoint/Humidity Offsets



Anti-sweat circuits are controlled by dewpoint. Dewpoint in an anti-sweat circuit's area may be determined either by a dewpoint cell or by a relative humidity sensor used in conjunction with a temperature sensor. If the dewpoint cell or relative humidity sensor is known to read high or low, offsets may be specified in the Dewpoint Offset and Humidity Offset fields to correctly calibrate the sensors. Users may enter a value from -20% to 20% or from -20° to 20°.

11.4.9. Anti-Sweat Outputs Setup



Heater zone names and the on/off interval of the anti-sweat circuit are set up in this screen.

All anti-sweat heaters connected to the PMAC's 8DO must be given board and point addresses in the Input Definition screen (Section 11.8.1.).

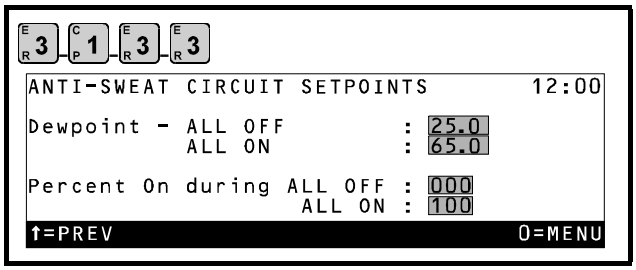
ON/OFF Interval [1 - 240 sec.] [10 sec.]

The 8DO on the PMAC panel pulses heaters ON for a percentage of a defined time interval. This interval is entered in the ON/OFF Interval field.

Name [15 characters max]

In the field to the right of the anti-sweat heater number, a name may be entered.

11.4.10.Anti-Sweat Circuit Setpoints


ER3-CP1-ER3-ER3
ANTI-SWEAT CIRCUIT SETPOINTS 12:00
Dewpoint - ALL OFF : 25.0
ALL ON : 65.0
Percent On during ALL OFF : 000
ALL ON : 100
↑=PREV 0=MENU

Anti-sweat circuits are controlled by comparing a measured or calculated dewpoint value to a range of dewpoints defined in the Anti-Sweat Circuit Setpoints screen. See **Section 3.5.,** ***Anti-Sweat Control***, for a complete explanation of anti-sweat control.

Dewpoint All OFF/All ON [-20° - 99°] [25°/65°]

The Dewpoint All OFF set point is the minimum dewpoint below which the anti-sweat circuit's heaters will remain OFF at all times. The Dewpoint All ON set point is the maximum dewpoint above which the anti-sweat circuit's heaters will remain ON at all times. Between these dewpoint values, the anti-sweat circuit will pulse ON and OFF for a percentage of the time interval defined in **Section 11.5.1.,** *Setup*.

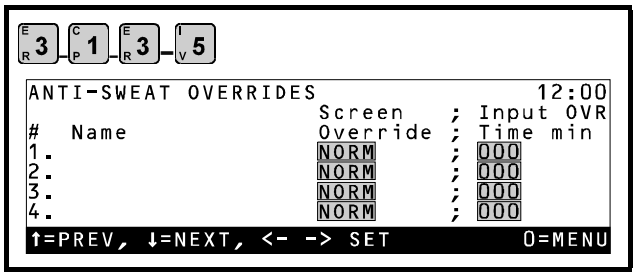
Percent On During All OFF [0 - 30%] [0%]

By default, anti-sweat circuits operate at 0% when the dewpoint is below the Dewpoint All OFF set point. If desired, a lower value for All OFF may be specified.

Percent On During All ON [70 - 100%] [100%]

By default, anti-sweat circuits operate at 100% when the dewpoint is above the Dewpoint All ON set point. If desired, a lower value for All ON may be specified.

11.4.11.Anti-Sweat Overrides



Manual and external anti-sweat heater bypasses are configured at the Anti-Sweat Overrides screen.

Name

The name defined for the anti-sweat heater is shown in the Name field next to the number.

Screen Override

Users may order a manual bypass by entering ON or OFF in the heater's Screen Override field. When bypassed in this manner, the anti-sweat heater will remain ON or OFF until a user terminates the bypass by entering NORM in the heater's Screen Override field.

Input OVR Time Min [0 - 240 min.] [0 min.]

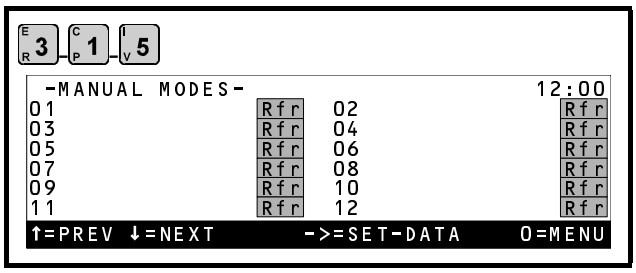
Anti-sweat heaters may also be overridden OFF by closing an external input. When this input is closed, the heater will remain OFF for as long as the output is closed or for an amount of time equal to the Input OVR Time Min, whichever is greater. Enter the minimum amount of time the heater will remain OFF in this field.

Anti-sweat override inputs must be configured in the Input Definition screen (see Section 11.8.1. Input Definitions). They are listed in the Input Definitions screen as inputs ASC#1 OVRD through ASC#8 OVRD.

11.4.12.Alarm Set Points

Standard Circuit Control Alarm Set Point screens are also accessed by selecting the Setup Command from the Standard Circuit Control Menu. For descriptions of these screens, see **Section 14.1.,** *Alarm Set Points*.

11.4.13.Manual Defrost



In the Manual Modes screens, the status of circuits 1-48 are shown in the field to the right of the number (Rfr for refrigeration, Dfr for defrost, etc.) Defrost for each defined circuit within the RMCC may be manually activated or deactivated by entering a command in the circuit's field **[1=Defrost, 2=End, 3=Start Override, 4=Emergency Defrost] [Rfr]**.

Defrost

When defrost is manually activated, defrost will run within the selected circuit for the defrost duration defined at the Circuit Set Points 1 screen (see Section 11.4.18. Circuit Set Points 1). Defrost termination strategies defined at the Circuit Setup 2 screen (see Section 11.4.17. Circuit Setup 2) are ignored. After the defrost duration has been completed, the circuit will return to normal refrigeration after the defined Drain Time. To manually activate a defrost cycle within a selected circuit, enter "1" in the appropriate circuit field.

End

Both manual and scheduled defrost cycles may be manually deactivated at the Manual Defrost screen. When defrost is manually deactivated, the circuit is returned to normal refrigeration after the programmed termination drain time is completed. To manually deactivate a defrost cycle within a selected circuit, enter "2" in the appropriate circuit field.

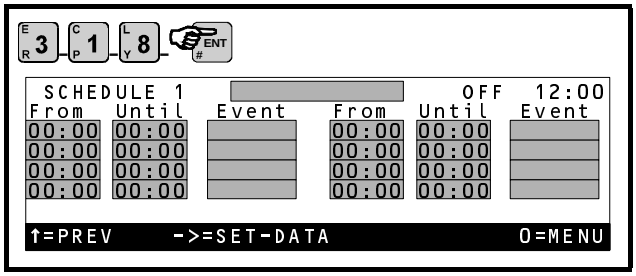
Start Override

In addition to the activation and deactivation of defrost, circuits may also be manually overridden OFF at the Manual Defrost screen. When a manual override is activated, the selected circuit will shut down until the override is deactivated at this screen. To activate a manual override within a selected circuit, enter "3" in the appropriate circuit field.

Emergency Defrost

Pressing "4" initiates an emergency defrost sequence. Emergency defrost is practically identical to the normal defrost sequence initiated by pressing "1", except the emergency defrost ignores the values of termination sensors and defrosts for the full defrost duration (defined in **Section 11.4.18.,** *Circuit Set Points 1*). The only way an emergency defrost may be terminated before the full defrost duration is to select the End "2" option from the manual defrost screen.

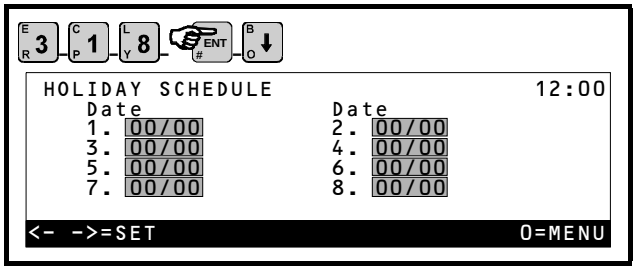
11.4.14.Light Schedules



A schedule is a grouping of times that designates when the lights in the circuit cases will be ON or OFF. Up to four schedules may be defined for assignment the standard circuits. These schedules are defined at the Light Schedules screen.

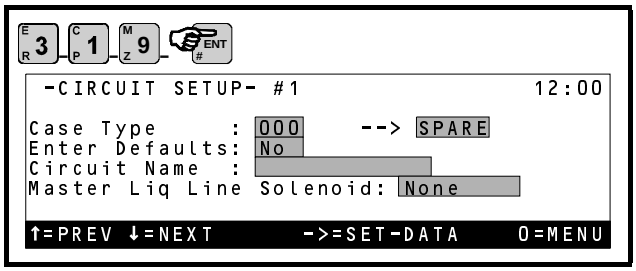
At this screen, users are first prompted to name the current schedule **[15 Characters]**. Users may then configure the schedule in the From and Until fields. Enter the time when the lights will be turned on in the From field and the time when the lights will be turned off in the Until field **[00:00 - 24:00]**. For each time period, designate the day of the week the time period will take effect in the Event field **[(S)unday, (M)onday, (T)uesday, (W)ednesday, Thu(R)sday, (F)riday, S(A)turday, or (7) Days]**.

11.4.15.Holiday Schedule



Up to eight holiday dates may be entered into the RMCC's Holiday Schedule. All lighting schedules will be overridden OFF during any of the defined holiday dates **[01/01 - 12/31] [00/00]**.

11.4.16.Circuit Setup 1


-CIRCUIT SETUP- #1 12:00
Case Type : 000 --> SPARE
Enter Defaults: No
Circuit Name :
Master Liq Line Solenoid: None
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

All standard circuits defined within the controlled system are setup using the Circuit Setup screens.

Case Type [0 - 64] [0]

The type of case controlled by the selected standard circuit is defined in the Case Type field. Users may choose from the case types displayed in **Table 11-3**. Select any key to view a list of all available case types.

Enter Defaults [(Y)es, (N)o] [N]

Default configuration information for all available case types is stored within the RMCC. It is recommended that the default values for circuit defrost be entered since this action guarantees that all necessary set points are established. Each set point may then be reviewed, revised, or cleared as necessary.

Circuit Name [12 Character Limit]

The Circuit Name is a user-defined or default system-defined identifier for the selected circuit.

Master Liquid Line Solenoid [(M)aster LLS, (1 - 4) Group LLS, (N)one] [N]

All hot gas circuits contain a master liquid line solenoid. When using a refrigeration system other than the Hussmann PROTOCOL® system, there will be a single master liquid line solenoid for all groups controlled by the RMCC; enter "M"aster in the Liq Line Solenoid field. When using a Hussmann PROTOCOL® system, the group supplying the circuit will have its own master liquid line solenoid; enter the number of the suction group within which the solenoid is located.

If the selected circuit is not a hot gas circuit, enter "N"one in the Master Liq Line Solenoid field.

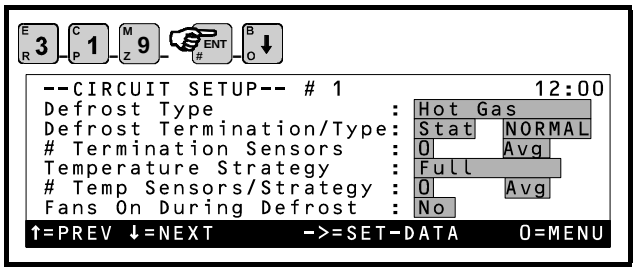
Type	Abbr.	Description	Set Point	High Alarm/ Time	Low Alarm/ Time	Defrost Type			
						Hot Gas	Elec.	Rev. Air	Time
0	Spare	Spare for future use RMCC defaults the case type to this setting. Make sure that a case type is selected.							
1	SDIC	Single deck ice cream	-25	-5/60	-30/60	2/18	1/45	1/60	1/60
2	MDIC	Multi-deck ice cream	-25	-5/60	-30/60	3/22	3/45	2/60	2/60
3	SDFJ	Single deck freezer juice	-18	0/60	-30/60	2/18	1/45	1/60	1/60
4	MDFJ	Multi-deck freezer juice	-10	5/60	-25/60	3/22	3/45	2/60	2/60
5	RIIC	Reach-in ice cream	-15	-5/60	-25/60	2/22	1/45	1/60	1/60
6	ICBX	Ice cream freezer box	-20	-5/60	-30/60	3/20	2/45	2/60	2/60
7	SDFF	Single deck freezer food	-15	5/60	-25/60	2/18	1/60	1/60	1/60
8	RIFJ	Reach-in freezer juice	-15	-5/60	-20/15	2/22	1/45	1/60	1/60
9	FRBX	Frozen food box	-12	-5/60	-20/15	3/18	3/45	2/60	2/60
10	FFBX	Frozen fish box	-12	-5/60	-20/15	3/18	3/45	2/60	2/60
11	FJBX	Frozen juice box	-12	-5/60	-25/60	3/18	3/45	2/60	2/60
12	MDFF	Multi-deck freezer food	-10	0/60	-20/60	2/22	1/45	2/60	2/60
13	FZBK	Multi-deck freezer bakery	-10	0/60	-20/60	2/22	1/45	2/60	2/60
14	RIFF	Reach-in freezer food	-10	5/60	-15/60	1/20	1/60	1/60	1/60
15	SDMT	Single deck meat	22	32/60	12/60	3/18	3/45	3/60	3/60
16	SDPF	Single deck prepared	22	32/60	12/60	3/18	3/45	3/60	3/60
17	PZZA	Single deck pizza	22	32/60	12/60	3/18	3/45	3/60	3/60
18	KOSH	Single deck kosher	22	32/60	12/60	3/18	3/45	3/60	3/60
19	SDFH	Single deck fish	22	32/60	12/60	3/18	3/45	3/60	3/60
20	MDMT	Multi-deck meat	23	34/60	18/60	4/18	4/45	4/60	4/60
21	MDPO	Multi-deck poultry	23	34/60	18/60	4/18	4/45	4/60	4/60
22	MDFH	Multi-deck fish	23	34/60	18/60	4/18	4/45	4/60	4/60
23	RIMC	Reach-in meat	25	35/60	15/60	2/18	2/45	2/60	2/60
24	SVMT	Service meat	22	35/60	15/60	2/18	2/45	2/60	2/60
25	SVFH	Service fish	22	35/60	15/60	2/18	2/45	2/60	2/60
26	MTBX	Meat cooler	30	42/60	22/60	3/18	3/45	2/60	2/60
27	HDBX	Meat holding box	30	44/60	22/60	3/18	3/45	2/60	2/60
28	DYCS	Multi-deck dairy	35	44/60	24/60	4/20	4/45	2/60	4/60
29	RFDY	Rear load dairy	28	38/60	18/60	4/20	4/45	2/60	4/45
30	RIDY	Reach-in dairy	30	40/60	20/60	4/20	4/45	2/60	2/60
31	DYBX	Dairy cooler	34	44/60	24/60	2/22	2/45	2/60	2/60
32	BKBX	Bakery Cooler	36	46/60	26/60	2/22	2/45	2/60	2/60
33	PRBX	Produce cooler box	36	50/60	30/60	2/22	2/45	2/60	2/60
34	MILK	Milk case	34	40/60	20/60	4/20	4/45	2/60	2/60
35	PKDL	Packaged deli	32	38/60	18/60	4/20	4/45	2/60	2/60
36	DLDS	Deli display case	34	38/60	18/60	4/20	4/45	2/60	2/60
37	CHEZ	Cheese case	34	40/60	20/60	3/18	3/45	2/45	2/60
38	POBX	Poultry box	36	42/60	22/60	4/20	4/45	2/45	2/60
39	BEER	Beer/Beverage	34	44/60	24/60	2/18	2/45	2/45	2/60
40	BVCS	Beverage case	34	44/60	24/60	2/18	2/45	2/45	2/60
41	DLBX	Deli cooler box	36	46/60	26/60	3/18	3/45	2/45	2/60
42	FHBX	Fish cooler box	36	46/60	26/60	3/18	3/45	2/45	2/60
43	SVDL	Service deli	32	42/60	22/60	2/16	2/45	2/60	1/40
44	PRCS	Produce case	35	45/60	25/60	2/16	2/45	2/60	3/40
45	ISPR	Produce case (island)	35	45/60	25/60	2/16	2/45	2/60	1/60
46	SALD	Salad table	36	50/60	30/60	2/16	2/45	2/60	1/60
47	FLBX	Flower cooler box	40	54/60	34/60	2/16	2/45	2/60	2/40
48	FLWR	Flower cooler	40	54/60	34/60	2/16	2/45	2/60	2/40

Table 11-3 *- Case Type Default Settings*

Type	Abbr.	Description	Set Point	High Alarm/ Time	Low Alarm/ Time	Defrost Type			
						Hot Gas	Elec.	Rev. Air	Time
49	CTBX	Controlled temp box	50	75/30	40/15	2/16	2/45	2/60	2/45
50	SDPO	Single deck poultry	24	38/60	18/60	2/16	2/45	2/45	2/60
51	CAKE	Bakery cake case	40	55/60	35/60	2/16	2/45	2/45	2/60
52	BART	Bakery retarder	35	60/60	40/60	2/16	2/45	2/45	2/60
53	RTDR	Bakery retarder	35	60/60	40/60	2/16	2/45	2/45	2/60
54	MTPK	Meat packaging room	45	60/60	40/60	2/16	2/45	2/45	2/90
55	MTCU	Meat cutting room	45	60/60	40/60	2/16	2/45	2/45	2/90
56	MTPR	Meat prep room	45	60/60	40/60	2/16	2/45	2/45	2/90
57	MTWR	Meat wrapping room	45	60/60	40/60	2/16	2/45	2/45	2/90
58	FHPR	Fish prep room	45	60/60	40/60	2/16	2/45	2/45	2/90
59	SBCL	Subcooler	55	60/30	45/30	2/16	2/45	2/60	2/45
60	PRPR	Produce prep room	55	65/60	45/60	2/16	2/45	2/45	2/90
61	SDFM	Single deck freezer meat	-10	0/60	-20/60	2/18	2/40	1/35	1/45
62	RIFM	Reach-in freezer meat	-10	2/60	-18/60	2/18	2/40	1/35	1/45
63	MDFM	Multi-deck freezer meat	-10	0/60	-20/60	2/18	2/40	2/60	2/45
64	BKFZ	Bakery freezer box	-12	-2/60	-22/60	2/18	2/30	2/60	2/45

Table 11-3 *- Case Type Default Settings*

11.4.17.Circuit Setup 2


E R 3
C P 1
M Z 9
ENT #
B O
--CIRCUIT SETUP-- # 1 12:00
Defrost Type : Hot Gas
Defrost Termination/Type: Stat NORMAL
Termination Sensors : 0 Avg
Temperature Strategy : Full
Temp Sensors/Strategy : 0 Avg
Fans On During Defrost : No
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

All standard circuits are set up at the Circuit Setup screens. If the Enter Defaults feature was activated at the first Circuit Setup screen (see Section 11.4.16. Circuit Setup 1), the default settings for the defined case type should be displayed in all fields at the Circuit Setup 2 screen.

Defrost Type [(H)ot Gas, (E)lectric, (R)ev Air, (T)imed] [H]

The defrost type for the selected circuit is defined in the Defrost Type field and should be defined according to the case type.

Defrost Termination [(S)tat, (T)emp, (N)one] [S]

The strategy the RMCC uses to terminate defrost within the selected standard circuit is defined in the Defrost Termination field. Users may enter one of the following strategies:

- *(S)tat* - the RMCC will terminate defrost when it detects a change of state from a dry contact (non-voltage contact closure).
- *(T)emp* - the RMCC will terminate defrost when the temperature monitored by the defrost termination sensor surpasses the defined Termination Temperature set point. This set point is defined at the Circuit Setpoints 1 screen (see Section 11.4.18. Circuit Set Points 1).
- *(N)one* - the RMCC will terminate defrost after the defined Defrost Duration has elapsed. This duration is defined at the Circuit Setpoints 1 screen (see Section 11.4.18. Circuit Set Points 1).

Defrost Termination Type [(N)ormal, (P)ulsed] [N]

The Termination Type is defined in the Defrost Termination Type field. This type determines the status of the system after defrost is terminated. Users may choose from the following Termination Types:

- *(N)ormal* - when defrost is terminated, the RMCC will prevent refrigerant from entering the coil for the duration specified in the Drain Time field (see Section 11.4.18. Circuit Set Points 1). The RMCC will then resume refrigeration.
- *(P)ulsed* - the circuit will remain in defrost mode for the defined Defrost Duration. If during this time a termination is called for by either the Stat or Temp Termination strategies, the RMCC will remain in defrost and pulse the defrost heat on and off in an effort to keep the case temperature within the range of the Termination Temperature's dead band (defined in Section 11.4.18. Circuit Set Points 1). The RMCC will shut off defrost heat when the case temperature exceeds the defined Termination Tempera-

ture's dead band and reactivate if the temperature falls below the Termination Temperature dead band.

When the defrost duration is over, the RMCC will prevent refrigerant from entering the coil for the duration specified in the Drain Time field (see Section 11.4.18. Circuit Set Points 1). The RMCC will then resume normal refrigeration.

Termination Sensors [0 - 6] [0]

Each standard circuit may be configured with up to six Termination Sensors. Enter the number of sensors within the selected circuit in the # Termination Sensors field.

Termination Sensors Strategy [Min, Max, Avg] [Avg]

If all termination sensors are digital sensors, defrost will terminate when all sensors are CLOSED.

The Termination Sensors Strategy field determines how multiple termination sensors will be combined into a single termination control value. Users may choose from the following strategies:

- *Avg* - the average of the temperature sensor readings is used to control termination.
- *Max* - the highest temperature sensor reading is used to control termination.
- *Min* - the lowest temperature sensor reading is used to control termination.

Temperature Strategy [(F)ull, (E)PR Valve] [F]

The Temperature Strategy field determines how the refrigeration solenoid will operate within this circuit. Users may choose from the following two strategies:

- *Full* - the refrigeration solenoid is being used to control refrigeration in this circuit. When Full is selected, this solenoid will open and close in an effort to maintain the Control Temperature within the circuit. The Control Temperature is defined at the Circuit Setpoints 1 screen (see Section 11.4.18. Circuit Set Points 1).
- *EPR Valve* - a mechanical EPR or other regulating device is being used to control refrigeration in this circuit. When EPR is selected, the refrigeration solenoid will only be used to activate or deactivate refrigerant flow during calls for defrost.

Temp Sensors [0 - 6] [0]

Enter the number of case temperature sensors within the selected circuit in the # Temp Sensors field.

Temp Strategy [(0) Average, (1) Max, (2) Min] [0]

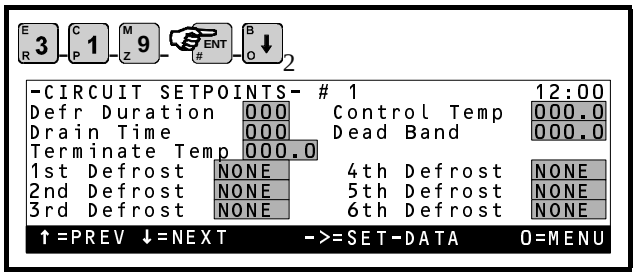
When multiple temperature sensors are being used to measure case temperature, the RMCC must be told how to calculate the controlling temperature reading from the different sensors. Users may choose from the following strategies:

- *(0) Average* - the average of the temperature sensor readings is used to control case temperature.
- *(1) Maximum* - the highest temperature sensor reading is used to control case temperature.
- *(2) Minimum* - the lowest temperature sensor reading is used to control case temperature.

Fans On During Defrost [(Y)es, (N)o] [N]

To continue normal operation of fans during defrost, enter "Y"es in the Fans On During Defrost field. Enter "N"o to shut off all fans during defrost.

11.4.18.Circuit Set Points 1


-CIRCUIT SETPOINTS- # 1 12:00
Defr Duration 000 Control Temp 000.0
Drain Time 000 Dead Band 000.0
Terminate Temp 000.0
1st Defrost NONE 4th Defrost NONE
2nd Defrost NONE 5th Defrost NONE
3rd Defrost NONE 6th Defrost NONE
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Set points for controlling each Standard Circuit are defined at the Circuit Setpoints screens.

Defr Duration [0 - 240 minutes] [0]

The Defrost Duration is the maximum amount of time the circuit should remain in defrost. If no Termination Type is defined, or when termination temperature is not met, the circuit will exit defrost when the defined Defrost Duration is complete.

Control Temp [-99° - 99°] [0]

When controlling the selected circuit based on the Full Temperature Strategy (see Section 11.4.17. Circuit Setup 2), the Control Temperature is the temperature that should be maintained within the circuit. Degree units are determined by the unit selected at the System Units screen (see Section 11.8.7. System Units).

Drain Time [0 - 240 minutes] [0]

Immediately following defrost, an unacceptable amount of moisture may still be present on the evaporator coils. When refrigeration begins, this moisture may freeze and reduce system performance.

Dead Band [0 - 10] [0]

A dead band may be established around the Control Temperature and the Terminate Temperature set points. The dead band is a value equally above and below the Control Temperature set point within which the temperature level is considered to be acceptable. Establishing a dead band helps alleviate short-cycling of the case expansion valves during refrigeration and, for certain types of defrost, alleviates short-cycling of the defrost heat.

Terminate Temp [-99° - 99°] [0]

The Termination Temperature set point is the temperature at which defrost should terminate if Temp is chosen as the Defrost Termination Strategy at the Circuit Setup 2 screen (see Section 11.4.17. Circuit Setup 2). Degree units are determined by the unit selected at the System Units screen (see Section 11.8.7. System Units).

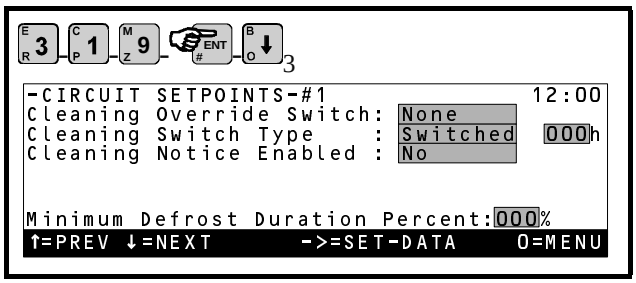
1st - 6th Defrost (Circuit Defrost Times) [00:00 - 23:59, (N)one] [N]

RMCC software version 1.05 will not allow defrost to begin within 60 minutes after the conclusion of the previous defrost event.

Circuit defrost start times are established in the 1st-6th Defrost fields. Defrost begins within the selected circuit at the times defined in these fields. Up to six defrost times may be defined for each circuit.

When programming defrost start times, note that the RMCC will allow overlapping of defrost times within circuits. Overlapping defrost times may not be appropriate, especially when running hot gas defrost systems.

11.4.19.Circuit Set Points 2



Selected circuits are overridden OFF for cleaning purposes based on the configuration defined at the Circuit Set Points 2 screen. This feature is optional within the RMCC; therefore, default values will not apply to this screen.

Cleaning Override Switch [(N)one, (C)lean, (D)oor] [N]

When the RMCC receives a contact closure from a Clean Switch input defined at the Input Definitions screens (see Section 11.8.1. Input Definitions), the circuit's refrigeration valve, defrost valve, and fans will be overridden OFF.

None must be entered in the Cleaning Override Switch field if no switch is to be used. If Clean is selected, the refrigeration and defrost outputs will be turned off when the cleaning switch input is closed. If a defrost was active, the defrost timer will continue to run while the Clean switch is closed. If the Clean switch is opened before the defrost time has expired, the defrost output will energize and continue until the defrost time does expire.

If Door is selected as the Cleaning Override Switch, only the refrigeration output will be turned off when the cleaning switch input is closed. If a defrost is active, the defrost output remains energized and the defrost continues as normal.

Cleaning Switch Type [(1) Timed, (2) Switched] [2]

Cleaning Switches perform cleaning overrides according to the strategy defined in the Cleaning Switch Type field. Users may choose from two cleaning override strategies:

- *(1) Timed* - momentary switch that overrides the circuit OFF for a defined period of time. When selected, the override duration should be entered in the second Cleaning Switch Type field.
- *(2) Switched* - manual switch that when closed activates the override and when open deactivates the override.

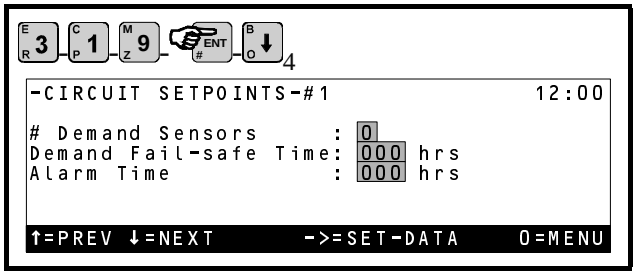
Cleaning Notice Enabled [(Y)es, (N)o]

To generate a notice in the RMCC Alarm Log when a Cleaning Override is activated, enter "Y"es in the Cleaning Notice Enabled field.

Minimum Defrost Duration Percentage [0–100%]

The minimum defrost duration percentage is the minimum percentage of time a circuit will be in defrost. If the Defrost Duration is set to 30 minutes (**Section 11.4.18.,** *Circuit Set Points 1*) and the Minimum Defrost Duration Percent is defined as 50%, the circuit will be in defrost at least 15 minutes.

11.4.20.Circuit Set Points 3



When the Demand Defrost feature is activated, the RMCC will only activate defrost when a contact closure is received from the installed Demand Defrost sensors or when the system reaches the demand fail-safe time. For more information about the Demand Defrost feature, see **Section 3,** ***Software Overview***. This feature is optional within the RMCC; therefore, default values will not apply to this screen.

Demand Sensors [0 - 2]

The number of Demand Sensors installed within each circuit is defined in the # Demand Sensors field. If two Demand Sensors are used, the RMCC must receive an ON status from both sensors to activate Demand Defrost. If either of the two sensors relay OFF, Demand Defrost will not be activated.

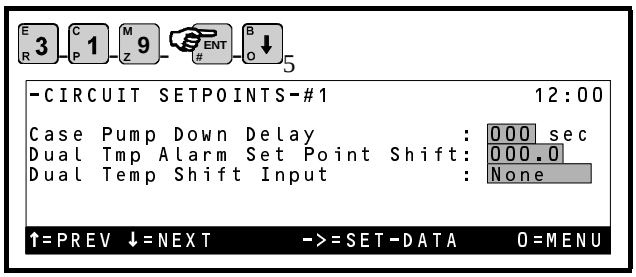
Demand Fail-safe Time [0 - 240 hours]

The Demand Fail-safe is the maximum duration the RMCC will keep the circuit out of defrost when a contact closure is not received from the Demand Defrost sensor installed in the case. This time should be the maximum duration in hours the case should remain in normal refrigeration mode without a stage of defrost. When controlling defrost using defrost times set within the RMCC, defrost will occur at the defined defrost time following the demand fail-safe time.

Alarm Time [0 - 240 hours]

The RMCC will activate an alarm in the Alarm Log when defrost has not occurred in the selected circuit for the defined Alarm Time.

11.4.21.Circuit Set Points 4



Circuit settings for the Pump Down Delay and Dual Temp Case features are defined at the Circuit Set Points 4 screen.

Case Pump Down Delay [0 - 240 seconds] [0]

Defrost performance is improved by specifying a duration during which the system empties or "pumps down" refrigerant from the evaporator coil. This procedure ensures that residual refrigerant in the coil will not work against the defrost cycle. When the delay is activated within a Standard Circuit, the refrigeration solenoid is closed for the defined delay before the defrost cycle begins. During this delay, the Defrost and Master Liquid Line Valves are also closed.

Dual Tmp Alarm Set Point Shift [-99° - 99°] [0]

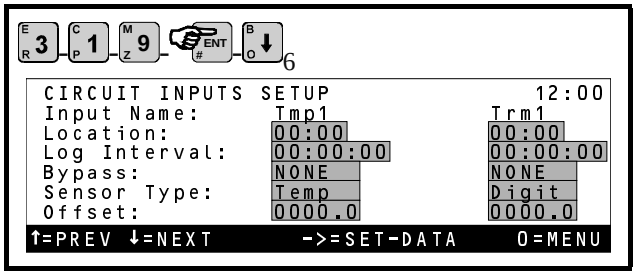
This setting does not change the temperature set point within the case, it only offsets the alarm set point by the amount specified in the field.

The Dual Temperature Alarm Shift Set Point is the value added to the defined Circuit Alarm Temperature Set Points when a contact closure is detected from the Extra input. The Circuit Alarm Temperature Set Points are defined at the Alarm Set Points screen (see **Section 14.1.,** *Alarm Set Points*).

Dual Temp Shift Input [(0) None, (1) Dual Temp Support] [0]

Enter "1" for Dual Temp Support in the Dual Temp Shift Input field if a dual temperature case is defined within the circuit.

11.4.22.Circuit Inputs Setup



All Temperature Control, Defrost Termination, Cleaning Switch, Extra (or Dual Temp), and Demand Sensor inputs defined within the RMCC are configured at the Circuit Inputs Setup screen. This screen will display only those sensors defined at the Circuit Setup screens and only applicable fields will be active.

Input Name

The name of the defined sensor to be configured is displayed in the Input Name field.

Location [BB:PP, BB = Board, PP = Point]

The board and point number on the 16AI board where the selected sensor is located is defined in the Location field. The network address of the 16AI board is defined by a network dip switch on the board. Enter this number in the first Location field. Each defined sensor is physically connected to a specific point on the 16AI board. This number is printed on the board above the input connection. Enter this number in the second Location field.

The RMCC uses this address to locate the selected sensor.

Log Interval [00:00:00 - 24:00:00]

The RMCC periodically records the values received from the defined sensors and stores the information in the RMCC Log. The Logging Interval defines when the data received from the sensors are recorded.

Bypass [-50 - 99, (N)one, (O)pen, (C)losed]

A fixed bypass may be assigned to the defined sensors in the Bypass field. A fixed bypass will override the actual sensor reading with a user-defined value until the bypass is deactivated at this screen. Users may bypass the current sensor reading with a numerical value, or with an open or closed status. To activate the fixed bypass, enter a numerical value, “O”pen, or “C”losed in the Bypass field.

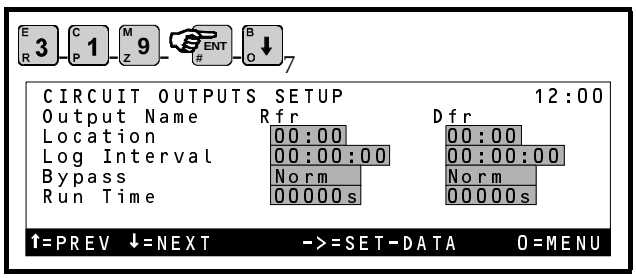
Sensor Type [(T)emp, (6)450, (D)igital] [T]

If the circuit has been configured with the default values for the type of case within the circuit, the appropriate sensor type for the selected sensor will be displayed in the Sensor Type. Users may change the sensor type to either a temperature sensor or a digital sensor by entering the appropriate letter in the Sensor Type field.

Offset [-99 - 99] [0]

At times, a sensor may provide a reading that reads lower or higher than the known condition being monitored. An offset value may be entered in the Offset field to calibrate the sensor to actual conditions.

11.4.23.Circuit Output Setup



The circuit Refrigeration, Defrost, and Master Liquid Line Solenoid outputs are configured at the Circuit Output Setup screen. This screen will display only those outputs defined at the Circuit Setup screens and only applicable fields will be active.

Output Name

The name of the defined output to be configured is displayed in the Output Name field.

Location [BB:PP, BB = Board, PP = Point]

The board and point number on the 8RO board where the selected output is located is defined in the Location field. The network address of the 8RO board is defined by a network dip switch on the board. Enter this number in the first Location field. Each defined output is physically connected to a specific point on the 8RO board. This number is printed on the board above the output connection. Enter this number in the second Location field.

The RMCC uses this address to locate the selected output.

Log Interval [00:00:00 - 24:00:00]

The RMCC periodically records the status of the defined outputs and stores the information in the RMCC Log. The Logging Interval defines when the data received from the outputs are recorded.

Bypass [(N)ormal, (O)n, O(F)f] [N]

A fixed bypass may be assigned to the defined outputs in the Bypass field. A fixed bypass will override the normal system settings with a user-defined ON or OFF value until the bypass is deactivated at this screen.

Run Time [(0) Clear Run Time] [0]

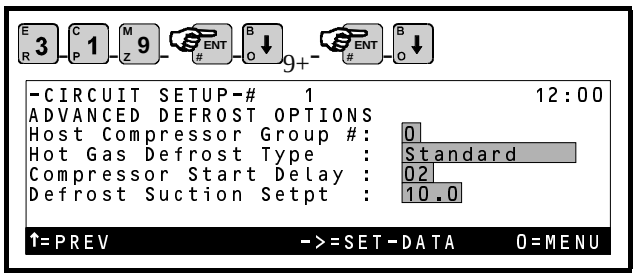
A real-time clock within the RMCC records the cumulative runtimes of each output. The cumulative runtime is the total number of hours each output has been activated for the duration the RMCC has been connected or since the last Clear Runtime command. This calculation is displayed and may be reset in the Run Time field.

11.4.24.Advanced Defrost

-ADVANCED DEFROST-#1 12:00
Setup Advanced Defrost Options? NO
NOTE: There is no additional setup if you select NO.
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

When using Hussmann Refrigeration's PROTOCOL®, the RMCC's Advanced Defrost Feature is available. There are three types of advanced defrost systems available: Advanced Hot Gas Defrost, Advanced Reversed Cycle Hot Gas Defrost, and Advanced Electric Defrost. To activate the Advanced Defrost Feature, enter "Y"es in the Setup Advanced Defrost Options field. Selecting "Y"es will activate the appropriate Advanced Defrost Options screen according to the type of defrost system defined. From this screen, Advanced Defrost Set Points are defined.

11.4.25.Advanced Defrost Options (Hot Gas)


-CIRCUIT SETUP-# 1 12:00
ADVANCED DEFROST OPTIONS
Host Compressor Group #: 0
Hot Gas Defrost Type : Standard
Compressor Start Delay : 02
Defrost Suction Setpt : 10.0
↑=PREV ->=SET-DATA 0=MENU

Hussmann PROTOCOL® Advanced Defrost set points for Advanced Hot Gas Defrost are defined at the Advanced Defrost Options screen. If controlling with an Electric Defrost System, see Section 11.4.26. Advanced Defrost Options (Electric).

Host Compressor Group # [1 - 4 Group Number, (0) Disable] [0]

The Host Compressor Group # field ties a specific compressor group to the circuit. To define the compressor group, enter the appropriate Compressor Group Number, or Suction Group Number, in the Host Compressor Group # field. Group numbers are defined at the Compressor Setup screen (see Section 11.2.6. Compressor Setup).

Hot Gas Defrost Type [(S)tandard, (R)everse Cycle] [S]

There are two types of Advanced Hot Gas Defrost Systems. Users may choose from the following types:

- *(S)tandard* - all compressors within the host group are shut down during the defrost duration and return to normal operation when the defrost duration is complete.
- *(R)everse Cycle* - all compressors within the host group are shut down for the Compressor Start Delay defined below and are then cycled to maintain the programmed Defrost Suction Set Point also defined below. Defrost is terminated and compressors return to normal operation based on the selected termination strategy.

To define the Hot Gas Defrost Type, enter the letter corresponding to the desired type in the Hot Gas Defrost Type field.

Compressor Start Delay [0 - 60 minutes] [2]

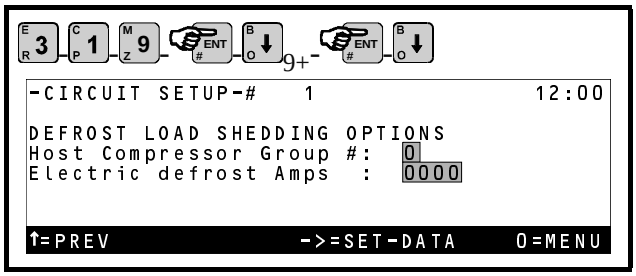
When the Reverse Cycle Hot Gas Defrost Type is chosen, all compressors within the host group are shut down for the Compressor Start Delay defined in the Compressor Start Delay field. This delay allows pressure equalization within the system. To define the delay, enter a value between 0 and 10 minutes in the Compressor Start Delay field.

Defrost Suction Set Point [-999 - 999] [10.0]

After the compressors within the host group have been shut down for the Compressor Start Delay, they are cycled to maintain the Defrost Suction Set Point defined in the Defrost Suction Set Point field. To define the Defrost Suction

Set Point, enter a value between 1 and 50 psi in the Defrost Suction Set Point field.

11.4.26.Advanced Defrost Options (Electric)


3 1 9 ENT 9+ ENT
-CIRCUIT SETUP-# 1 12:00
DEFROST LOAD SHEDDING OPTIONS
Host Compressor Group #: 0
Electric defrost Amps : 0000
↑=PREV ->=SET-DATA 0=MENU

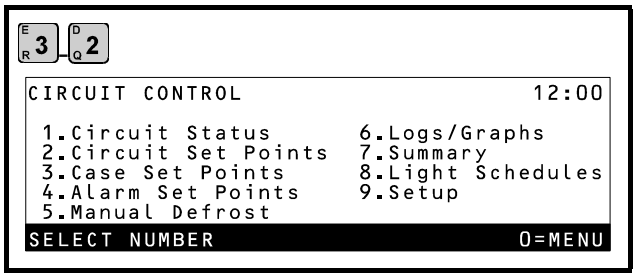
Hussmann PROTOCOL® Advanced Defrost Set Points for Advanced Electric Defrost are defined at the Advanced Defrost Options (Electric) screen. This feature analyzes the number of amps drawn by each compressor within the circuit's suction group (defined in Section 11.2.7. Group 1 Setup), compares it to the load that will be drawn by defrost, and interlocks one or more compressors in order to shed enough load to compensate for defrost.

The RMCC assumes that power wiring is designed for a maximum load equal to all compressors running at the same time. When defrost is initiated, the defrost output is delayed for one minute. During this time, a compressor control algorithm determines how many amps are available to run the defrost output and interlocks one or more compressors, if required, to make more current available for defrost.

Compressors bypasses take priority over load shedding; if a compressor is bypassed ON, it will not be deactivated by this feature. Also, if the One Compressor Always Remain On feature is enabled for the compressor group (see Section 11.2.8. Pressure Setup), one compressor will remain on even if the Advanced Defrost calls for all compressors to be deactivated.

Enter the circuit's compressor group or suction group number in the Host Compressor Group # field, or enter a zero to disable the feature **[(1 - 4) Group Number, (0) Disable]**. Enter the number of amps being drawn by the defrost heaters in the Electric Defrost Amps field **[-999 - 999]**.

11.4.27.Case Control

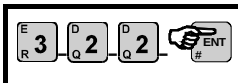


Case set points may not be viewed until a case controller is physically attached to the RMCC I/O network.

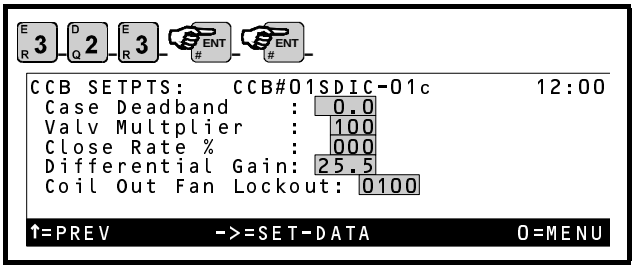
Item	Description	Page
1	Circuit Status	13-5
2	Circuit Set Points	11-32
3	Case Set Points	11-33
4	Alarm Set Points	14-1
5	Manual Defrost	11-37
6	Logs/Graphs	11-38
7	Summary	11-38
8	Light Schedules	11-38
9	Setup	11-38

11.4.28.Circuit Set Points

Case Control Circuit set points are also accessed by selecting the Setup command from the Case Circuit Control Menu. For descriptions of these screens, see Section 11.4.46. Circuit Set Points 1 (Add/Edit Circuit)**.**



11.4.29.CCB Set Point Screen 1 (Liquid Pulse and Stepper Only)


CCB SETPTS: CCB#01SDIC-01c 12:00
Case Deadband : 0.0
Valv Multplier : 100
Close Rate % : 000
Differential Gain: 25.5
Coil Out Fan Lockout: 0100
↑=PREV ->=SET-DATA 0=MENU

The Electronic Expansion Valve (EEV) is an electronically controlled expansion valve that is cycled via pulse width modulation (PWM). The EEV regulates the operation of the evaporator based on superheat measurements from two sensors located at the inlet and outlet of the evaporator. Set points for the control of the evaporator are defined at the CCB Set Points screen.

Superheat Set Point (Supht Setpnt) [3° - 24°] [8.0]

The term "superheat" refers to the temperature differential across the evaporator coil (coil outlet - coil inlet). The Superheat Set Point is the superheat temperature the RMCC will maintain within the selected case. Degree units are determined by the unit selected at the System Units screen (see Section 11.8.7. System Units).

Revision

The current CCB software revision is automatically displayed in the Revision field.

Sensitivity [0 - 9] [4]

Sensitivity is a value that either increases or decreases the reaction of the EEV to superheat changes. The lower the sensitivity, the slower the reaction time; the higher the sensitivity, the faster the reaction time. For a more detailed explanation of sensitivity, see **Section 5.3.1.3.,** ***Valve Control***.

Recovery % [10 -100] [70]

System Recovery mode occurs when the valve has been fully closed because either the temperature set point was satisfied or because of defrost. To reactivate superheat control, a recovery sequence is necessary since, in both of these instances, the coil is empty. To refill the coil and re-establish superheat, the valve is opened a certain percentage for a fixed period of time. See **Section 5.3.1.6.,** ***System Recovery Mode.*** for more information.

The EEV will open between 10 and 100%, based on a six second control window, to achieve the Superheat Set Point.

Max Recy Time [1 - 60]

Unless the coil achieves superheat and exits recovery mode early, recovery mode will terminate after the Max Recy Time has passed.

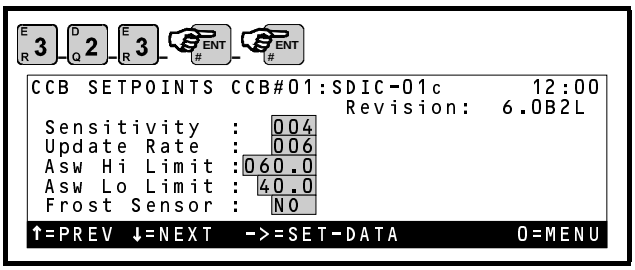
Asw Hi Limit [25 - 100] [60.0]/Asw Lo Limit [0 - 75] [40.0]

When the Anti-Sweat feature is activated in the selected circuit at the Circuit Setpoints 2 screen (see Section 11.4.47. Circuit Set Points 2 (Add/Edit Circuit)), the anti-sweat heater range for each case is defined in the Asw Hi and Lo Limit fields. If the humidity is higher than the ASW Hi Limit, the anti-sweat heaters will remain on at all times. If the humidity is lower than the Asw Lo Limit, the anti-sweat heaters will remain off at all times. Between these set points, the anti-sweat heaters will cycle in a six second window according to the humidity level.

Frost Sensor [(Y)es, (N)o] [N]

If a Demand Defrost Sensor is installed at the selected case, enter "Y"es in the Frost Sensor field. Demand Defrost set points may then be defined at the Circuit Setpoints 3 screen (see Section 11.4.48. Circuit Set Points 3 (Add/Edit Circuit)).

11.4.30.CCB Set Points Screen 1 (CPC Suction Stepper Only)



Using this screen, users may set up valve sensitivity, update rate, anti-sweat heaters, and demand defrost sensors for suction stepper CCBs.

Sensitivity [0 - 9] [4]

Sensitivity is a value that either increases or decreases the reaction of the suction stepper to case temperature changes. The lower the sensitivity, the slower the reaction time; the higher the sensitivity, the faster the reaction time. For a more detailed explanation of sensitivity, see **Section 6,** *Case Control.*

Update Rate [1 - 60] [6]

The Update Rate is the number of seconds it takes for the suction valve to complete a single control loop. Lower update rate values will cause the valve to react faster to case temperature changes, while high update rate values will slow the valve's reaction time. The default value, six seconds, should be a sufficient update rate for nearly all cases; however, if the case temperature is fluctuating because the valve is overreacting to temperature changes, a higher update rate might be necessary.

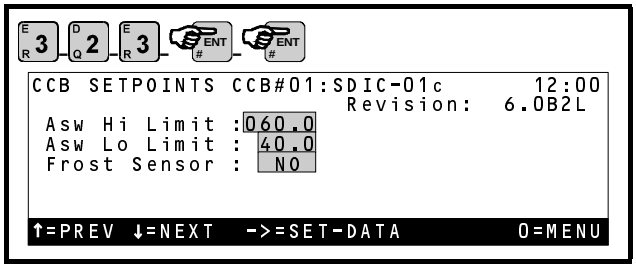
Asw Hi Limit [25 - 100] [60.0]/Asw Lo Limit [0 - 75] [40.0]

When the Anti-Sweat feature is activated in the selected circuit at the Circuit Setpoints 2 screen (see Section 11.4.47. Circuit Set Points 2 (Add/Edit Circuit)), the anti-sweat heater range for each case is defined in the Asw Hi and Lo Limit fields. If the humidity is higher than the ASW Hi Limit, the anti-sweat heaters will remain on at all times. If the humidity is lower than the Asw Lo Limit, the anti-sweat heaters will remain off at all times. Between these set points, the anti-sweat heaters will cycle in a six second window according to the humidity level.

Frost Sensor [(Y)es, (N)o] [N]

If a Demand Defrost Sensor is installed at the selected case, enter "Y"es in the Frost Sensor field. Demand Defrost set points may then be defined at the Circuit Setpoints 3 screen (see Section 11.4.48. Circuit Set Points 3 (Add/Edit Circuit)).

11.4.31.CCB Set Points Screen 1 (Hussmann Suction Stepper Only)



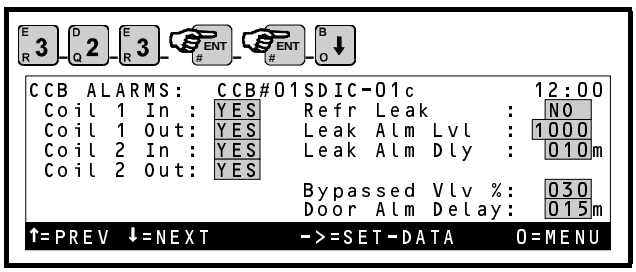
Asw Hi Limit [25 - 100] [60.0]/Asw Lo Limit [0 - 75] [40.0]

When the Anti-Sweat feature is activated in the selected circuit at the Circuit Setpoints 2 screen (see Section 11.4.47. Circuit Set Points 2 (Add/Edit Circuit)), the anti-sweat heater range for each case is defined in the Asw Hi and Lo Limit fields. If the humidity is higher than the ASW Hi Limit, the anti-sweat heaters will remain on at all times. If the humidity is lower than the Asw Lo Limit, the anti-sweat heaters will remain off at all times. Between these set points, the anti-sweat heaters will cycle in a six second window according to the humidity level.

Frost Sensor [(Y)es, (N)o] [N]

If a Demand Defrost Sensor is installed at the selected case, enter "Y"es in the Frost Sensor field. Demand Defrost set points may then be defined at the Circuit Setpoints 3 screen (see Section 11.4.48. Circuit Set Points 3 (Add/Edit Circuit)).

11.4.32.CCB Set Point Screen 2 (Liquid Pulse and Stepper Only)


CCB ALARMS: CCB#01SDIC-01c 12:00
Coil 1 In : YES
Coil 1 Out: YES
Coil 2 In : YES
Coil 2 Out: YES
Refr Leak : NO
Leak Alm Lvl : 1000
Leak Alm Dly : 010m
Bypassed Vlv %: 030
Door Alm Delay: 015m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Case alarm control includes the generation of alarms when the RMCC detects coil in or coil out sensor failures or when it detects a refrigerant leak. An alarm is a high-level warning that creates an entry in the RMCC Alarm Log and may be accompanied by a contact closure for on-site operation of a bell, light, horn, etc. An alarm may also initiate an alarm dialout sequence and/or the activation of the 485 Alarm Panel.

The alarm configuration for each case is defined at the CCB Alarms screen.

Coil 1 In [(Y)es, (N)o] [Y]

To generate an alarm when the RMCC detects a Coil 1 In sensor failure, enter "Y"es in the Coil 1 In field.

Coil 1 Out [(Y)es, (N)o] [Y]

To generate an alarm when the RMCC detects a Coil 1 Out sensor failure, enter "Y"es in the Coil 1 Out field.

Coil 2 In [(Y)es, (N)o] [Y]

To generate an alarm when the RMCC detects a Coil 2 In sensor failure, enter "Y"es in the Coil 2 In field.

Coil 2 Out [(Y)es, (N)o] [Y]

To generate an alarm when the RMCC detects a Coil 2 Out sensor failure, enter "Y"es in the Coil 2 Out field.

Refr Leak [(Y)es, (N)o] [N]

To activate an alarm when a defined amount of refrigerant is detected by a leak sensor, enter “Y”es in the Refr Leak field.

Leak Alm Lvl [0 - 100 ppm] [100]

The Leak Alarm Level is an amount of refrigerant that when detected by a leak sensor activates an alarm. The Leak Alarm Level is defined in parts per million.

Leak Alm Dly [0 - 120 minutes] [10]

The Leak Alarm Delay is the specified measurement of time the RMCC must wait before generating a Refrigerant Leak Alarm after the specified amount of refrigerant has been detected by a leak sensor.

Bypassed Vlv % [0 - 100] [30]

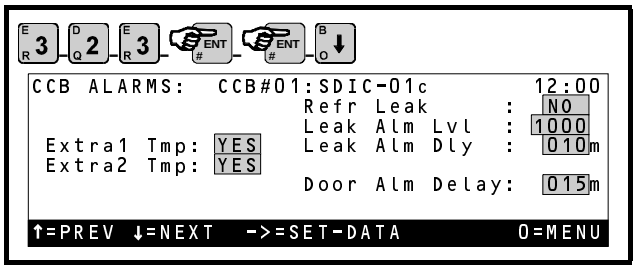
The Bypassed Valve Percentage set point is defaulted in the RMCC to 30%. It may be necessary to find the optimum percentage by simulating a failure to test the case’s reaction.

When the selected case is in a fail-safe mode (see **Section 5.3.1.10.*, Fail-Safe Mode (Liquid Side Control Only)***), the case controller opens the EEV to a fixed valve percentage. This percentage is the Bypassed Valve Percentage. The fail-safe function maintains an adequate degree of refrigeration during alarm situations.

Door Alm Delay [0 - 120 minutes] [15]

If a Door Switch is defined at the Circuit Set Points 4 screen (see Section 11.4.49. Circuit Set Points 4 (Add/Edit Circuit)), the Door Alarm Delay may be defined in the Door Alm Delay field. The Door Switch disables refrigeration, turns off fans, and turns on all lights within the walk-in cooler. When switched again, any calls for refrigeration and fans are reactivated and all lights are turned off. However, if the switch is not switched back after the designated Door Alarm Delay, an Open Door Alarm will be generated and the cooler will return to normal operation.

11.4.33.CCB Set Points Screen 2 (Suction Stepper Only)


CCB ALARMS: CCB#01:SDIC-01c 12:00
Refr Leak : NO
Leak Alm Lvl : 1000
Extra1 Tmp: YES
Leak Alm Dly : 010m
Extra2 Tmp: YES
Door Alm Delay: 015m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Refr Leak [(Y)es, (N)o] [N]

To activate an alarm when a defined amount of refrigerant is detected by a leak sensor, enter “Y”es in the Refr Leak field.

Leak Alm Lvl [1 - 100] [100]

The Leak Alarm Level is an amount of refrigerant that, when detected by a leak sensor, activates an alarm. Enter the Leak Alarm Level, in parts per million, in the Leak Alm Lvl field.

Leak Alm Dly [0 - 120 minutes] [10]

The Leak Alarm Delay is the amount of time the RMCC must wait before generating a Refrigerant Leak Alarm after the specified amount of refrigerant has been detected by a leak sensor.

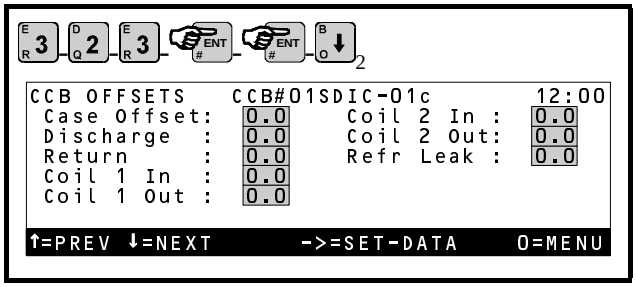
Extra Tmp [(Y)es, (N)o] [Y]

If desired, the RMCC will generate an alarm if one or both of the extra temperature sensors fail.

Door Alm Delay [0 - 120 minutes] [15]

If a Door Switch is defined at the Circuit Set Points 4 screen (see Section 11.4.49. Circuit Set Points 4 (Add/Edit Circuit)), the Door Alarm Delay may be defined in the Door Alm Delay field. The Door Switch disables refrigeration and walk-in cooler fans, and turns on all cooler lights. When switched again, any calls for refrigeration and fans are reactivated and all lights are turned off. However, if the switch is not switched back after the designated Door Alarm Delay, an Open Door Alarm will be generated and the cooler will return to normal operation.

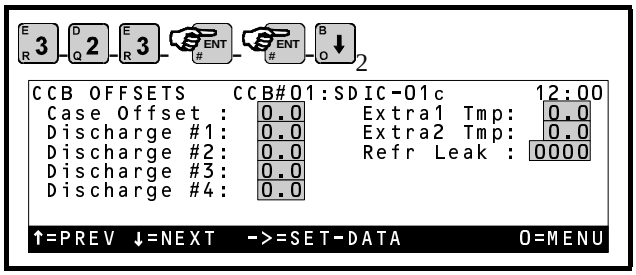
11.4.34.CCB Set Point Screen 3 (Liquid Pulse and Stepper Only)


CCB OFFSETS CCB#01SDIC-01c 12:00
Case Offset: 0.0
Discharge : 0.0
Return : 0.0
Coil 1 In : 0.0
Coil 1 Out : 0.0
Coil 2 In : 0.0
Coil 2 Out: 0.0
Refr Leak : 0.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

At times, a sensor may provide a reading that reads lower or higher than the known condition being monitored. An offset value may be entered at the CCB Offsets screen to calibrate selected sensors to actual conditions.

To offset a displayed sensor, enter an offset value between -9° and 9°, or between 0 ppm and 99 ppm for the refrigerant leak sensor, in the appropriate fields.

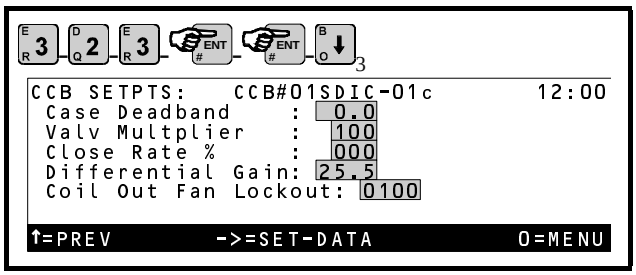
11.4.35.CCB Set Points Screen 3 (Suction Stepper Only)



At times, a sensor may provide a reading that reads lower or higher than the known condition being monitored. An offset value may be entered at the CCB Offsets screen to calibrate selected sensors to actual conditions.

To offset a displayed sensor, enter an offset value between -9° and 9° or between 0 and 99 ppm in the appropriate fields.

11.4.36.CCB Set Point Screen 4 (Liquid Pulse and Stepper Only)


CCB SETPTS: CCB#01SDIC-01c 12:00
Case Deadband : 0.0
Valv Multplier : 100
Close Rate % : 000
Differential Gain: 25.5
Coil Out Fan Lockout: 0100
↑=PREV ->=SET-DATA 0=MENU

Case Deadband [0° - 12°] [0.6]

The Case Dead Band is a value equally above and below the Control Temperature Set Point defined at the Circuit Set Points screen (see Section 11.4.46. Circuit Set Points 1 (Add/Edit Circuit)). When the case temperature exceeds the dead band, refrigeration will be activated within the case. When the case temperature falls below the dead band, the refrigeration valve closes according to the Close Rate Percentage defined below.

Valv Multiplier [25 - 100] [100]

The Valve Multiplier is a value that allows the capacity of the EEV to be reduced. This value should only be adjusted in special applications where the valve appears to be oversized.

Close Rate % [15% - 255%] [255]

When 255% is defined as the Close Rate, the EEV will close immediately.

When refrigeration is deactivated within the case, the EEV closes according to the Close Rate Percentage. The EEV will close the defined percentage within one minute of the call for the deactivation of refrigeration within the case.

Derivative Gain [0 - 25]

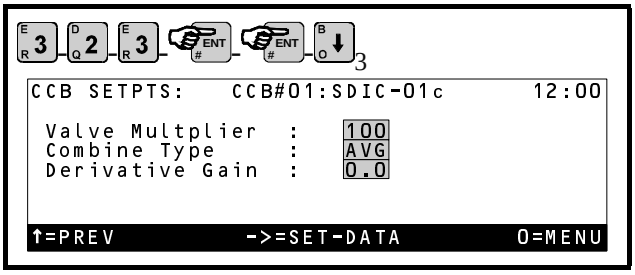
The derivative gain is a multiplier used by CCBs that are operating valves using PID control. The larger the derivative gain, the greater the size of the Derivative mode's reaction to rapid changes in the PID input. See **Section 3.1.1.,** ***Programming PID***, for more information on the derivative mode.

Coil Out Fan Lockout [-99 - 99] [100]

To disable the Coil Out Fan Lockout feature, enter a temperature set point of 99.

If desired, the evaporator fan may be disabled when the coil outlet temperature climbs above the temperature set point defined in the Coil Out Fan Lockout. To activate this feature, specify a temperature set point in the Coil Out Fan Lockout field.

11.4.37.CCB Set Points Screen 4 (CPC Suction Stepper Only)



Valv Multiplier [25 - 100] [100]

The Valve Multiplier is a value that allows the capacity of the EEV to be reduced. The default setting is 100% and should only be adjusted in special applications where the valve appears to be oversized. To adjust the Valve Multiplier, enter a value between 25 and 100% in the Valv Multiplier field.

Combine Type [(A)vg, (M)in, Ma(X)] [A]

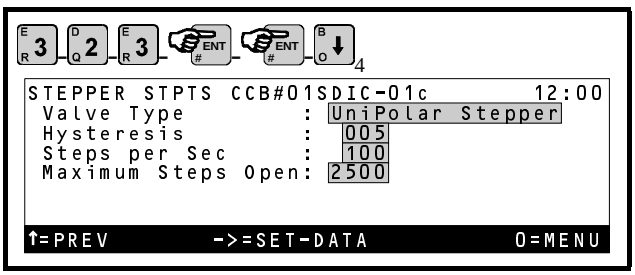
The suction stepper uses four temperature sensors to measure discharge air temperature. The RMCC must be told how to combine these values into a single discharge air temperature reading. Users may choose three different combining methods:

- *(A)VG* - The RMCC uses the average of the sensors to calculate discharge air temperature.
- *MI(N)* - The RMCC uses the lowest sensor reading as the discharge air temperature.
- *MA(X)* - The RMCC uses the highest sensor reading as the discharge air temperature.

Derivative Gain [0 - 25] [0]

The derivative gain is a multiplier used by CCBs that are operating valves using PID control. The larger the derivative gain, the greater the size of the Derivative mode's reaction to rapid changes in the PID input. See **Section 3.1.1., *Programming PID***, for more information on the derivative mode.

11.4.38.CCB Stepper Set Points Screen (Stepper Only)



If the EEV is a stepper valve, the stepper functions may be configured in this screen. Refer to Valve Types on Section Valve Types for all recommended settings for case control valves.

Valve Type [Bipolar, Unipolar]

Users must specify whether the valve is unipolar or bipolar in the Valve Type field.

Hysteresis [0 - 255]

The hysteresis value is the number of steps required by the valve to change direction. When a stepper valve is closing and receives a command to open, or when a valve is opening and receives a command to close, the valve must continue to close or open for the number of steps equal to the valve's hysteresis value.

Steps per Second [1 - 100]

The maximum steps per second rate of a stepper valve is defined in the Steps per Second field.

Maximum Steps [50 - 6553]

The Maximum Steps value is the number of steps it takes for a stepper valve to travel from closed (0%) to open (100%).

11.4.39.Manual Defrost

Refer to the description of Manual Defrost on Section 11.4.13. Manual Defrost.

11.4.40.Logs/Graphs

Refer to the description of Logging and Graphing in **Section 12.1.4.,** *Standard Circuit Log/*.

E R 3 D Q 2 J W 6

11.4.41.Summary

Refer to the description of the Summary screens on Section 11.4.56. Circuit Summary.

E R 3 D Q 2 K X 7

11.4.42.Light Schedules

Refer to the description of Lighting Schedules on Section 11.4.14. Light Schedules.

E R 3 D Q 2 L Y 8

11.4.43.Setup

E R 3 D Q 2 M Z 9

```
SET UP MENU                          12:00

 1 Add/Edit Circuit   4 Bd/Pt Assignment
 2 Board-Cct Assgn    5 Utilites
 3 CCB Logging Times  6 Anti-Sweat Setup


SELECT NUMBER                        0=MENU
```

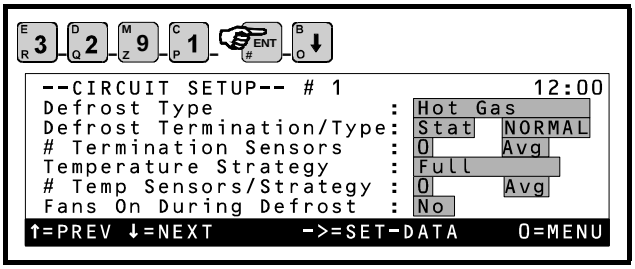
Item	Description	Page
1	Add/Edit Circuit	11-38
2	Board to Circuit Assignment	11-43
3	CCB Logging Times	12-2
4	Board/Point Assignment	11-43
5	Utilities	11-43
6	Anti-Sweat Setup	11-44

11.4.44.Circuit Setup 1 (Add/Edit Circuit)

Refer to the description of Circuit Setup 1 on Section 11.4.16. Circuit Setup 1.

E R 3 D Q 2 M Z 9 C P 1 ENT #

11.4.45.Circuit Setup 2 (Add/Edit Circuit)



All case control circuits are set up at the Circuit Setup screens. Each defined circuit is set up separately at these screens. If the Enter Defaults feature is activated at the First Circuit Setup screen (see Section 11.4.16. Circuit Setup 1), the default settings for the defined case type should be displayed in all fields at the Circuit Setup 2 screen.

Defrost Type [(H)ot Gas, (E)lectric, (R)everse Air, (T)imed]

The defrost type for the selected circuit is defined in the Defrost Type field and should be defined according to the case type. Enter one of the following defrost types:

Defrost Termination [(S)tat, (I)nl, (D)sch, (N)one, (R)trn]

The strategy the RMCC uses to terminate defrost within the selected case control circuit is defined in the Defrost Termination field. Users may choose from the following strategies:

- *(S)tat* - the RMCC will terminate defrost when it detects a change of state from a dry contact.
- *(I)nl* - the RMCC will terminate defrost when the Coil Inlet Sensor temperature reading exceeds the defined Termination Temperature set point. This set point is defined at the Circuit Setpoints 1 screen (see Section 11.4.46. Circuit Set Points 1 (Add/Edit Circuit)).
- *(D)sch* - the RMCC will terminate defrost when the Discharge Air Sensor temperature reading exceeds the defined Termination Temperature set point. This set point is defined at the Circuit Setpoints 1 screen.
- *(O)ut* - the RMCC will terminate defrost when the Coil Outlet Sensor temperature reading exceeds the defined Termination Temperature set point. This set point is defined at the Circuit Setpoints 1 screen.
- *(N)one* - the RMCC will terminate defrost when defrost has occurred for the defined Defrost Duration. This duration is defined at the Circuit Setpoints 1 screen.
- *(R)trn* - the RMCC will terminate defrost when the Return Air Sensor temperature reading exceeds the defined Termination Temperature set point. This set point is defined at the Circuit Setpoints 1 screen.

To define the defrost termination strategy, enter the letter corresponding to the desired strategy in the Defrost Termination field.

Defrost Termination Type [(N)ormal, (P)ulsed]

The Termination Type is also defined in the Defrost Termination field. This type determines the status of the system after defrost is terminated. Users may choose from the following Termination Types:

- *(N)ormal* - the RMCC will return to normal refrigeration operation.
- *(P)ulsed* - the circuit will remain in defrost mode for the defined Defrost Duration. If during this time a termination is called for by either the Stat, Inl, Dsch, Out, or Rtrn Termination strategies, the RMCC will remain in defrost and pulse the defrost heat on and off in an effort to keep the termination temperature reading equal to the Termination Temperature Setpoint. See Section 11.4.46. Circuit Set Points 1 (Add/Edit Circuit).

  The Termination Temperature has a fixed 2° dead band value for case control circuits. The RMCC will shut off defrost heat when the case temperature exceeds the Termination Temperature and reactivate if the temperature falls 2° below the Termination Temperature.

  When the defrost duration is over, the RMCC will prevent refrigerant from entering the coil for the duration specified in the Drain Time field (see Section 11.4.46. Circuit Set Points 1 (Add/Edit Circuit)). The RMCC will then return to normal refrigeration operation.

Valve Control Strategy [(T)emp-Temp, T(X)V]

The strategy used to control refrigerant flow is defined in the Valve Control Strategy field. Users may choose from the following strategies:

- *(T)emp-Temp* - the refrigerant flow is being metered by an EEV controlled by superheat (coil inlet temperature - coil outlet temperature). When refrigeration is called for, the EEV opens to a percentage determined by the control algorithm.
- *T(X)V* - the RMCC does not pulse 24 VAC, but turns refrigerant flow ON or OFF base on the case temperature.

Temp Control Strategy [(D)ischarge Air, (M)ixed]

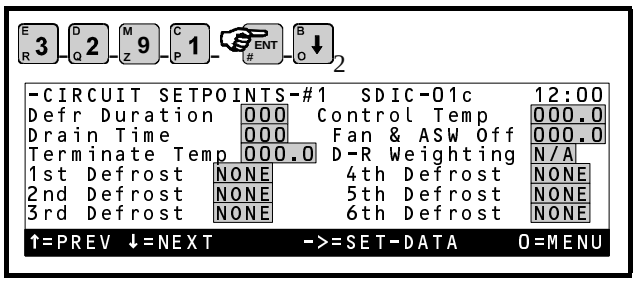
The strategy used to calculate the Control Temperature from the discharge and return air sensors is entered in the Temperature Control Strategy field. Users may choose from the following strategies:

- *Discharge Air* - the RMCC will use the discharge air sensor as the Control Temperature.
- *Mixed Air* - the RMCC will use a mixture of the discharge air and the return air to control the circuit temperature. Percentages are defined on Section 11.4.46. Circuit Set Points 1 (Add/Edit Circuit).

Fans On During Defrost [(Y)es, (N)o]

To continue normal operation of fans during defrost, enter "Y"es in the Fans On During Defrost field. Enter "N"o to shut off all fans during defrost.

11.4.46.Circuit Set Points 1 (Add/Edit Circuit)



Set points for controlling each refrigeration circuit are defined at the Circuit Setpoints screens. All case controls assigned to the selected circuit will be controlled by these defined set points.

Defr Duration [0 - 240 minutes]

The Defrost Duration is the maximum amount of time the selected circuit should remain in defrost. If no Termination Type is defined or if termination conditions are not met, the circuit will remain in defrost until the defined Defrost Duration is complete.

Control Temp [-99° - 99°]

The Control Temperature is the temperature that should be maintained within the circuit. Degree units are determined by the unit selected at the System Units screen (see Section 11.8.7. System Units).

Drain Time [0 - 240 minutes]

Immediately following defrost, moisture may still be present on the evaporator coils. When refrigeration begins, this moisture may freeze and reduce system performance. To establish a drain time, which is the duration after defrost the system sits idle before returning to refrigeration, enter a value between 0 and 999 seconds in the Drain Time field.

Fan & ASW Off [-50° - 99°]

When the temperature within the case exceeds a certain level, the RMCC will turn off all heat producing loads, including the fans and the anti-sweat heaters. This level is defined in the Fan & ASW Off field. The 99 default value disables this feature.

Terminate Temp [-99° - 99°]

The Termination Temperature set point is the temperature at which defrost should terminate if a certain strategy is chosen.

D-R Weighting [0 - 100, 0=All]

If the Mixed Air strategy is chosen as the Circuit Temperature Control strategy at the Circuit Setup 2 screen (see Section 11.4.45. Circuit Setup 2 (Add/Edit Circuit)), the discharge-to-return-air percentage is defined in the D-R Weighting field. Enter in the D-R Weighting field the percentage of Discharge Air to be mixed with the remaining percentage of Return Air.

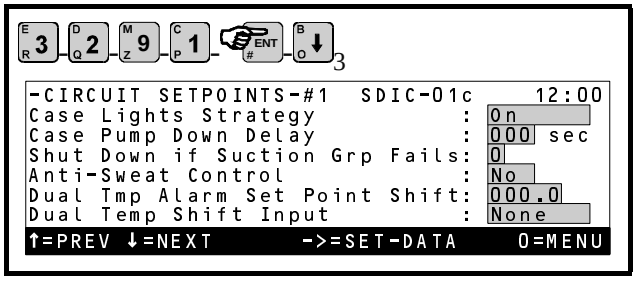
1st - 6th Defrost (Circuit Defrost Times) [00:00 - 23:59]

RMCC software version 1.05 will not allow defrost to begin within 60 minutes after the conclusion of the previous defrost event.

Circuit defrost start times are established in the 1st-6th Defrost fields. Defrost begins within the selected circuit at the times defined in these fields. Up to six defrost times may be defined for each circuit.

When programming defrost start times, note that the RMCC will allow overlapping of defrost times within circuits. Overlapping defrost times may not be appropriate, especially when running hot gas defrost systems.

11.4.47.Circuit Set Points 2 (Add/Edit Circuit)


3-2-9-1-ENT-↓3
-CIRCUIT SETPOINTS-#1 SDIC-01c 12:00
Case Lights Strategy : On
Case Pump Down Delay : 000 sec
Shut Down if Suction Grp Fails: 0
Anti-Sweat Control : No
Dual Tmp Alarm Set Point Shift: 000.0
Dual Temp Shift Input : None
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Circuit set points for lighting, pump down, anti-sweat, and dual temperature features are defined at the Circuit Set Points 2 screen.

Case Lights Strategy [Always (O)n, Always O(F)f, Schedules (1, 2, 3, 4)]

Lighting control within a case control circuit is determined by the Case Lights Strategy. Users may choose from the following Case Lights Strategies:

- *Always (O)n* - lights in the case are always on
- *Always O(f)f* - lights in the case are always off
- *(1234) Schedules* - lights in the case cycle on and off according to the selected schedule. Schedules are configured at the Light Schedules screen (see Section 11.4.42. Light Schedules).

Case Pump Down Delay [0 - 240 seconds]

Defrost performance is improved by specifying a duration during which the system empties or "pumps down" refrigerant from the evaporator coil. This procedure ensures that residual refrigerant for the coil does not work against the defrost cycle. When this delay is activated within a Case Control Circuit, the Suction Valve is opened for the defined delay before the defrost cycle begins. During this delay, the Pulse Width Modulation and Defrost Valves are also closed.

Shut Down if Suction Grp Fails [1 - 4 Group Number, (0) Disable]

The Shut Down if Suction Group Fails option will close all EEVs within a circuit under certain failure conditions. If a proof fail is received for all compressors in a group, along with a suction pressure reading above the high suction pressure set point (Section 11.2.3. Group 1 Pressure Alarms Setup), all case controllers associated with the group are put into wait mode and "WAIT" is displayed in the status field of the circuit setup screen. In addition, in the event of phase loss or a pressure reading above the discharge pressure trip point (Section 11.2.10. Group 1 Pressure Set Points), all case controllers associated with all defined suction groups are put into wait mode. When the failure condition has been corrected, the RMCC will stage the case controllers back on by bringing the first 16% on right away, and 16% every minute until all case controllers are back on and functioning.

Anti-Sweat Control [(Y)es, (N)o]

To activate anti-sweat heater control, enter "Y"es in the Anti-Sweat Control field. To deactivate control, enter "N"o.

Dual Tmp Alarm Set Point Shift [-99° - 99°]

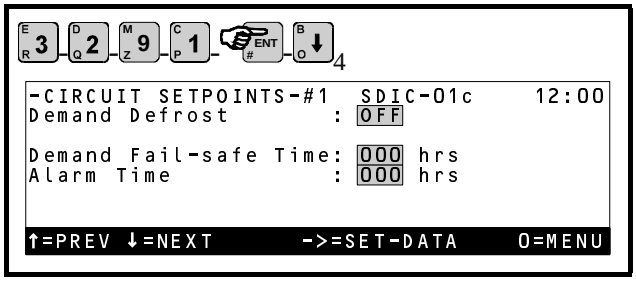
This setting does not change the temperature set point within the case, it only offsets the alarm set point by the amount specified in the field.

The Dual Temperature Alarm Shift Set Point is the value added to the defined Circuit Alarm Temperature Set Points when a contact closure is detected from an Extra input. The Circuit Alarm Temperature Set Points are defined at the Alarm Set Points screen (see **Section 14.1.,** *Alarm Set Points*).

Dual Temp Shift Input [(0) None, (1) Dual Temp Support]

Enter "1" for Dual Temp Support in the Dual Temp Shift Input field if a dual temperature case is defined within the circuit.

11.4.48.Circuit Set Points 3 (Add/Edit Circuit)


3 2 9 1 ENT
4
-CIRCUIT SETPOINTS-#1 SDIC-01c 12:00
Demand Defrost : OFF
Demand Fail-safe Time: 000 hrs
Alarm Time : 000 hrs
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

When the Demand Defrost feature is activated, the RMCC will only activate defrost when a contact closure is received from the installed demand sensor or when the system reaches the demand fail-safe time. For more information about the Demand Defrost feature, see **Section 4,** *Software Overview*. This feature is optional within the RMCC; therefore, default values will not apply to this screen.

Demand Defrost [(O)n, O(F)f

To activate the Demand Defrost Feature, enter “O”n in the Demand Defrost field. To deactivate Demand Defrost, enter Of”f”.

Demand Fail-safe Time [0 - 240 hours]

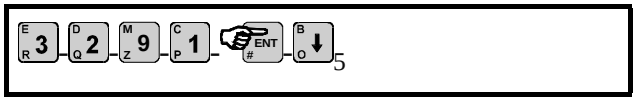
The Demand Fail-safe is the maximum duration the RMCC will keep the circuit out of defrost when a contact closure is not received from the Demand Defrost sensor installed in the case. This time should be the maximum duration in hours the case should remain in normal refrigeration mode without a stage of defrost. When controlling defrost using defrost times set within the RMCC, defrost will occur at the defined defrost time following the demand fail-safe time.

Alarm Time [0 - 240 hours]

The RMCC will activate an alarm in the Alarm Log when defrost has not occurred in the selected circuit for the defined Alarm Time. This Alarm Time is defined in the Alarm Time field.

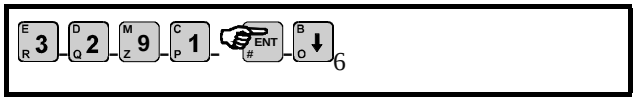
11.4.49.Circuit Set Points 4 (Add/Edit Circuit)

Refer to the description of Circuit Set Points 2 on Section 11.4.19. Circuit Set Points 2.



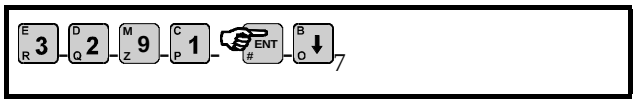
11.4.50.Circuit Inputs Setup 1 (Add/Edit Circuit)

Refer to the description of Circuit Inputs Setup on Section 11.4.22. Circuit Inputs Setup.

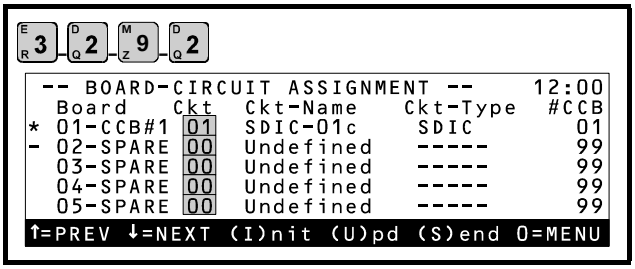


11.4.51.Circuit Outputs Setup (Add/Edit Circuit)

Refer to the description of Circuit Outputs Setup on Section 11.4.23. Circuit Output Setup.



11.4.52.Board to Circuit Assignment


3 2 9 2
-- BOARD-CIRCUIT ASSIGNMENT -- 12:00
Board Ckt Ckt-Name Ckt-Type #CCB
* 01-CCB#1 01 SDIC-01c SDIC 01
- 02-SPARE 00 Undefined ----- 99
03-SPARE 00 Undefined ----- 99
04-SPARE 00 Undefined ----- 99
05-SPARE 00 Undefined ----- 99
↑=PREV ↓=NEXT (I)nit (U)pd (S)end 0=MENU

After Case Control Circuits are programmed and the cases are installed and have a board ID number, the boards must be initialized into the system at the Board Circuit Assignment screen. After initialization, boards are assigned to a Case Control Circuit at the Board Circuit Assignment screen. **[0 - 48]**

(I)nitialization

Pressing "I" from this screen starts the Initialization command. The Initialization command scans the network for all boards connected to the circuit. The status of all boards found is returned to the Board Circuit Assignment screen. An asterisk "*" indicates the board was found and it is currently on-line. A dash "-" indicates the board is lost. When a board is lost, the system knows it is connected; however, the board cannot be located. If there is no indication next to the board, the board is not connected. If a board is lost or is not connected, confirm that the boards have been set up properly.

To cancel the initialization command, press any key. The RMCC will return all information gathered prior to the cancellation of the command.

(U)pdate

Pressing "U" begins the Update command. The update command is similar to the Initialization command in that it scans the network for all boards connected to the circuit. However, the update command retains all information that has already been received and only brings in new information.

(S)end

Pressing "S" begins the Send command. The RMCC monitors case controllers and updates its information with that of the case. Therefore, the set points at the case should match with the set points at the RMCC. If these set points do not correspond to each other, users may manually send the RMCC set points to the case controller by selecting the Send command.

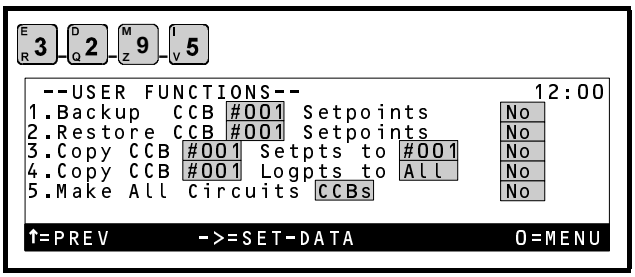
Circuit Assignment

After initialization of the boards, the boards must be assigned to a circuit by entering the desired circuit number in the CKT field. When the circuit is defined, the circuit name and type are automatically displayed in the Ckt-Name and Ckt-Type fields. The total number of cases defined to the circuit is displayed in the #CCB field.

11.4.53.Board/Point Assignment

Refer to the description of Circuit Inputs Setup on Section 11.4.22. Circuit Inputs Setup or Circuit Outputs Setup on Section 11.4.23. Circuit Output Setup.

11.4.54.Utilities


3 2 9 5
--USER FUNCTIONS-- 12:00
1.Backup CCB #001 Setpoints No
2.Restore CCB #001 Setpoints No
3.Copy CCB #001 Setpts to #001 No
4.Copy CCB #001 Logpts to All No
5.Make All Circuits CCBs No
↑=PREV ->=SET-DATA 0=MENU

Set points defined for each Case Controller Board are backed up, restored, and copied at the Utilities screen.

Backup

Activating the backup feature retrieves the current set points and setup configuration of one or all Case Controllers within the circuit. This information is stored within the RMCC and may be restored to any case with the Restore feature. To backup a Case Controller, enter the ID Number of the case to be backed up in the first Backup field and select "Y"es in the second.

Restore

The Restore option replaces the current case settings with the saved backup settings. This option is only active after the selected case has been backed up. To restore saved settings to the Case Controller, enter the ID Number of the target case in the first Restore field and select "Y"es in the second.

Copy Set Points

Case control set points defined for one Case Controller are copied to another Case Controller when the Copy Set Points feature is activated. To activate this feature, enter the ID Number of the source case in the first Copy Set Points field and the ID Number of the target case in the second. Finally, enter "Y"es in the third Copy Set Points field to perform the copy.

Copy Log Points

Logging Intervals defined for one Case Controller are copied to another or all Case Controller when the Copy Set Points feature is activated. To activate this feature, enter the ID Number of the source case in the first Copy Set Points field and the ID Number of the target case in the second. Finally, enter "Y"es in the third Copy Set Points field to perform the copy.

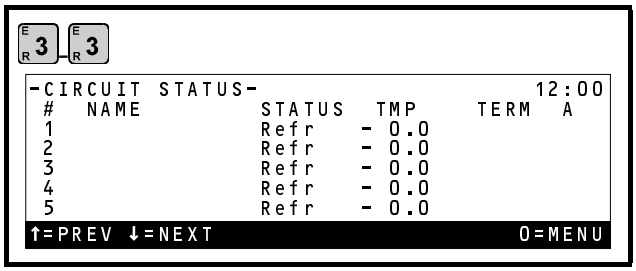
Make All Circuits CCBs

When this option is selected, all standard circuits are designated as case control circuits.

11.4.55.Anti-Sweat Setup

If the RMCC Anti-Sweat feature is activated at the Circuit Set Points 2 screen (see Section 11.4.47. Circuit Set Points 2 (Add/Edit Circuit)), the humidity or dewpoint sensor input that controls the anti-sweat heaters is configured at the Anti-Sweat Setup screen. Refer to the description of Circuit Inputs Setup on Section 11.4.22. Circuit Inputs Setup for information on the data fields.

11.4.56.Circuit Summary



Basic summary information about all standard circuits defined within the RMCC is listed at the Circuits Status Summary screen.

/ Name

The # and Name fields display the number and defined name of the circuit.

Status

The Status field displays the operating status of the circuit. The status will display "Refr" when the circuit is operating in refrigeration mode, "Defr" when the circuit is operating in defrost mode, "Ovrd" when the circuit is being manually overridden, or "Drip" when the circuit is in the drain time period immediately following defrost termination.

Tmp

The average of all discharge air sensors in the circuit is displayed in the Tmp field.

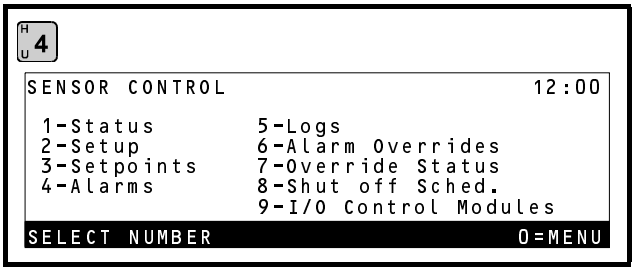
Term

The current termination temperature sensor reading is displayed in the Term field.

A (Alarms)

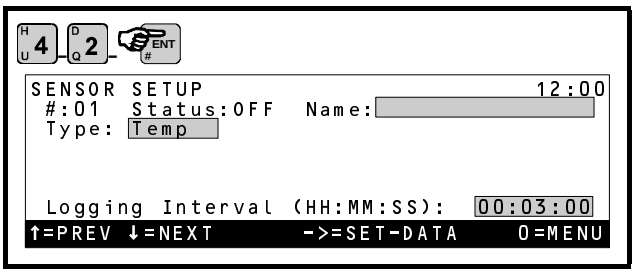
If there are any sensor, rack, or bypass failure alarms involving this circuit, the A field will display an asterisk. Details about the alarms may be found in the RMCC Alarm Log.

11.5. Sensor Control



Item	Description	Page
1	Status	13-8
2	Setup	11-45
3	Setpoints	11-46
4	Alarms	14-1
5	Logs	12-2
6	Alarm Overrides	14-2
7	Override Status	13-9
8	Shut Off Schedule	11-49
9	I/O Control Modules	11-49

11.5.1. Setup



RMCC sensors and all identification set points and commands associated with each sensor are defined at the Sensor Setup screen. Up to 48 sensors may be defined within the RMCC.

#/Status

Selecting the Setup command activates a sensor selection screen where users select the appropriate sensor number to be defined. The selected sensor number and the current status of the selected sensor are displayed at the Sensor Setup screen in the # and Status fields respectively.

Name [15 Character Limit]

The Sensor Name is a user-defined name that corresponds to the Sensor Number. While the RMCC uses various set points to determine the type and location of a particular sensor, the Sensor Name provides a convenient, easily recognized description of the sensor for the user.

Type [See Table] [Temp]

A complete list of common CPC sensor types and their software setup instructions is given in Appendix B.

The Sensor Type is the specific type of sensor to be read by the RMCC. There are 17 sensor types available. The sensor type should be defined according to the physical input connected to the 16AI board. To assign a type to a specified sensor, choose the appropriate type by scrolling through the list of types using the "." and "-" keys. The sensor types listed in ***Table 11-4***.

Input Type	Description
Temp	Temperature Sensor
100	100 Pound Pressure Transducer
200	200 Pound Pressure Transducer
500	500 Pound Pressure Transducer
Rfleak	Refrigerant Leak Detector
LiqLvl	Float-Type Liquid Level Transducer (does NOT include liquid level probe—this must be set up as a linear sensor—see ***Appendix B***)
RelHum	Humidity Sensor
Digit	Non-voltage Digital Sensor
Linear	Generic Sensor
KWatt	Watt-hour Transducer
DewPnt	Dewpoint Sensor
6450Tm	Margaux Temperature Sensor

Table 11-4 *- Input Types*

IRLDS	Infrared Leak Detector
Temp2Press	Refrigerant temperature converted to pressure
1Pres2Temp	100 lb. refrigerant pressure transducer converted to temperature.
2Pres2Temp	200 lb. refrigerant pressure transducer converted to temperature
5Pres2Temp	500 lb. refrigerant pressure transducer converted to temperature

***Table 11-4** - Input Types*

Refrigerant Type [options] [R502]

When the Temp2Press, 1Pres2Temp, 2Pres2Temp, and 5Pres2Temp sensor types are chosen, the Refrigerant Type field appears. These sensor types require a refrigerant type to be specified so that the RMCC can convert refrigerant temperatures to pressures or vice-versa.

To select a refrigerant type, scroll through the list of refrigerants using the "." and "-" keys. There are 10 different types to choose from:

- R502
- R22
- R401A
- R401B
- R402A
- R402B
- R408A
- R134A
- R404A
- R507

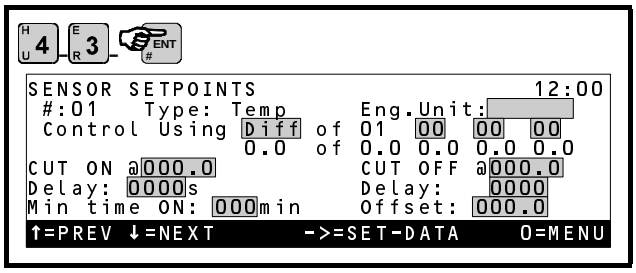
Temp/Press Input Offset [-999 - 999] [0]

If necessary, a temperature sensor or pressure transducer may be given an offset value that is applied before the temp-to-pressure or pressure-to-temp conversion takes place. This input offset is entered in the Temp Input Offset or Pres Input Offset field.

Logging Interval [00:00:00 - 24:00:00] [00:03:00]

The RMCC periodically records the values received from the defined sensors and stores the information in the RMCC Sensor Log (see **Section 12.1.6.,** *Sensor Logs*). The Logging Interval defines when the data received from the sensors are recorded. The RMCC will store a number of readings for each input equal to the amount of logs specified in Logging Setup. See Section 11.8.9. Logging Setup.

11.5.2. Set Points (all sensor types except IRLDS and Linear)


SENSOR SETPOINTS 12:00
#:01 Type: Temp Eng.Unit:
Control Using Diff of 01 00 00 00
0.0 of 0.0 0.0 0.0 0.0
CUT ON @000.0 CUT OFF @000.0
Delay: 0000s Delay: 0000
Min time ON: 000min Offset: 000.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Sensor set points are control parameters stored within the RMCC that are compared to sensor readings to determine the controlled output function. These set points are only defined when the selected sensor is controlling an output.

#/Type

Selecting the Setpoints command activates a sensor selection screen where users select, or may enter, the appropriate sensor number. The selected sensor number and the defined type of the selected sensor are displayed at the Sensor Set Points screen in the # and Type fields respectively.

Eng. Unit [5 Character Limit]

The RMCC reads a signal from the sensor and compares the signal to the sensor type to determine the correct analog value. Therefore, units of measure are not important to the RMCC. As a convenience to the user, a Units field is provided so that analog values displayed on the RMCC screen are easily interpreted. Enter the corresponding units of measure for a specified sensor type in the Eng. Unit field.

Control Using [(D)ifferential or 1st Only, (A)vg, Ma(X), Mi(N)] [D]

The control method defined in the Control Using field determines how to combine the values from up to four sensors. This combined or control value is then compared to defined set points and commands to determine the operational status of an output. Users may choose from the following four control methods:

- *(D)ifftl or 1st Only* - The RMCC calculates the differential of two sensors or uses the primary sensor value as the control value.
- *(A)VG* - The RMCC calculates the control value using the average reading of one or more sensors.
- *MA(X)* - The RMCC calculates the control value using the maximum sensor reading of one or more sensors.

- *MI(N)* - The RMCC calculates the control value using the minimum sensor reading of one or more sensors.

Up to three sensors may be combined with the current sensor. Enter the sensor number of the desired sensors to be combined in the three fields following the field displaying the current sensor number. The current status of the selected sensors are then displayed in the fields directly below the sensor number fields. The current calculated control value is displayed in the field directly below the Control Using field.

Cut On/Cut Off [-999 - 999, (N)one, (O)pen, (C)losed]

Sensor Cut-On and Cut-Off set points may be defined as specific values for analog input sensors or simply as contact closed or contact open for digital input sensors in the Cut On and Cut Off fields respectively. The Cut-In set point is the value at which the controlled output will turn on and the Cut-Out set point is the value at which the controlled output will turn off. There is a 1° dead band around each set point.

Cut On/Cut Off Delay [0 - 9999 seconds]

The Cut On and Cut Off Delays are specified measurements of time the RMCC must wait before activating or deactivating the controlled output.

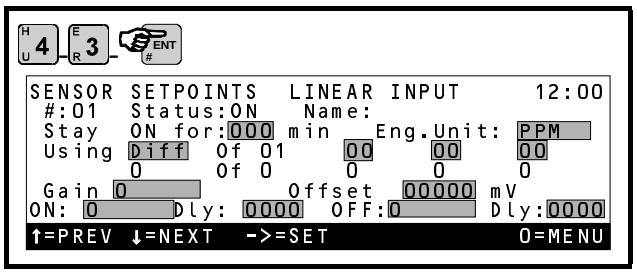
Min time ON [0 - 240 minutes]

When the Cut-In set point has been reached and the controlled output is activated, the output must remain on for the Minimum ON Time regardless of the Cut-Out set point.

Offset [-99 - 99]

At times, a sensor may provide a reading that reads lower or higher than the known condition being monitored. An offset value may be entered in the Offset field to calibrate the sensor to actual conditions. When an offset is made to a sensor, that value is then displayed in all status screens and the actual or raw value will no longer appear.

11.5.3. Set Points (for Linear sensor types only)


SENSOR SETPOINTS LINEAR INPUT 12:00
#:01 Status:ON Name:
Stay ON for:000 min Eng.Unit: PPM
Using Diff Of 01 00 00 00
0 Of 0 0 0 0
Gain 0 Offset 00000 mV
ON: 0 Dly: 0000 OFF:0 Dly:0000
↑=PREV ↓=NEXT ->=SET 0=MENU

If the Sensor Type chosen in **Section 11.5.1.,** *Setup,* was set to "IRLDS", this version of the Sensor Setpoints screen will appear. All other sensor types use the Sensor Setpoints screen as shown in **Section 11.5.4.** or **Section 11.5.2.**

The Sensor Setpoints Linear Input screen allows users to set up a generic linear sensor by specifying a gain, an offset, and cut-on/cut-off set points.

Stay ON for [0 - 240 min.] [0 min.]

The number entered in the Stay ON For field is the minimum number of minutes the sensor's output must remain on after the ON set point is reached.

Eng. Unit [5 characters max]

The RMCC reads a signal from the sensor and compares the signal to the sensor type to determine the correct analog value. Therefore, units of measure are not important to the RMCC. As a convenience to the user, a Units field is provided so that analog values displayed on the RMCC screen are easily interpreted. Enter the corresponding units of measure for a specified sensor type in the Eng. Unit field.

Control Using [(D)ifferential or 1st Only, (A)vg, Ma(X), Mi(N)] [D]

The control method defined in the Control Using field determines how to combine the values from up to four sensors. This combined or control value is then compared to defined set points and commands to determine the operational status of an output. Users may choose from the following four control methods:

- *(D)ifftl or 1st Only* - The RMCC calculates the differential of two sensors or uses the primary sensor value as the control value.
- *(A)VG* - The RMCC calculates the control value using the average reading of one or more sensors.
- *MA(X)* - The RMCC calculates the control value using the maximum sensor reading of one or more sensors.
- *MI(N)* - The RMCC calculates the control value using the minimum sensor reading of one or more sensors.

Up to three sensors may be combined with the current sensor. Enter the sensor number of the desired sensors to be combined in the three fields following the field displaying the current sensor number. The current status of the selected sensors are then displayed in the fields directly below the sensor number fields. The current calculated control value is displayed in the field directly below the Control Using field.

Gain [-999 - 999] [0]

The value entered in the Gain field is multiplied with the voltage from the sensor input to determine the sensor control value. The correct gain for the IRLDS sensor is 1.

Offset [-9999 - 9999] [0]

If necessary, an offset may be applied to the sensor value by entering a number in the Offset field. The number in the Offset field will be added to the sensor value.

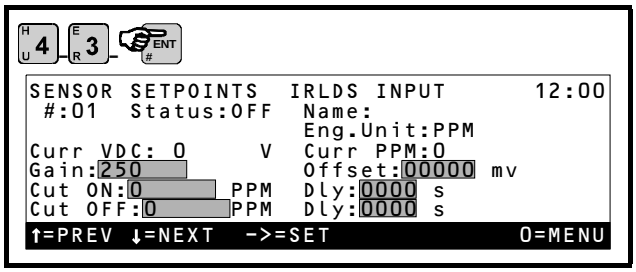
Cut On/Cut Off [-999 - 999, (N)one, (O)pen, (C)losed]

Sensor Cut-On and Cut-Off set points may be defined as specific values for analog input sensors or simply as contact closed or contact open for digital input sensors in the Cut On and Cut Off fields respectively. The Cut-In set point is the value at which the controlled output will turn on and the Cut-Out set point is the value at which the controlled output will turn off. There is a 1° dead band around each set point.

Cut On/Cut Off Delay [0 - 9999 seconds]

The Cut On and Cut Off Delays are specified measurements of time the RMCC must wait before activating or deactivating the controlled output.

11.5.4. Set Points (for IRLDS sensor type only)


SENSOR SETPOINTS IRLDS INPUT 12:00
#:01 Status:OFF Name:
Eng.Unit:PPM
Curr VDC: 0 V Curr PPM:0
Gain:250 Offset:00000 mv
Cut ON:0 PPM Dly:0000 s
Cut OFF:0 PPM Dly:0000 s
↑=PREV ↓=NEXT ->=SET 0=MENU

If the Sensor Type chosen in **Section 11.5.1.,** *Setup,* was set to "IRLDS", this version of the Sensor Setpoints screen will appear. All other sensor types use the Sensor Setpoints screen as shown in **Section 11.5.2.** or **Section 11.5.2.**

The Sensor Setpoints IRLDS Input screen allows users to calibrate an IRLDS input and to specify cut-on and cut-off set points for the sensor control output.

The current DC voltage from the IRLDS output is shown in the Curr VDC field. Beside this value is the Curr PPM value, which will always be equal to the Curr VDC multiplied by the gain added to the offset.

Gain [-999 - 999] [250]

The RMCC multiplies the actual DC voltage from the IRLDS with the number in the Gain field. The gain necessary for proper IRLDS-to-RMCC communication, 250 ppm/V, is entered by default. If no adjustments to the gain are needed, leave this value at 250.

Offset [-9999 - 9999] [0]

If the IRLDS's output is known to send a voltage that is higher or lower than it should be, an offset may be specified. The number of millivolts entered in the Offset field is added to the voltage received from the IRLDS times the gain. The result of this addition is entered in the Curr PPM field.

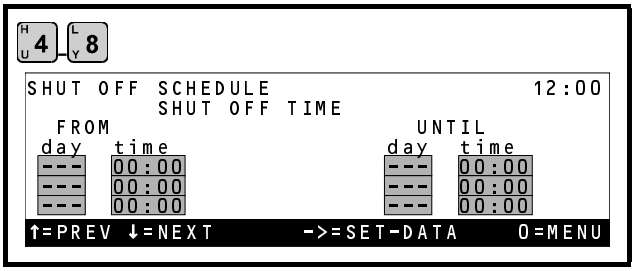
Cut ON/Cut OFF Setpoints [-9990 - 9990 PPM] [0 PPM]

The Cut ON and Cut OFF set points may be defined as specific PPM values. The Cut ON set point is the PPM value above which the controlled output will turn on. The Cut OFF set point is the value below which the controlled output will turn off. There is a 1° dead band around each set point.

Cut On/Cut Off Delay [0 - 9999 seconds]

The Cut On and Cut Off Delays are specified measurements of time the RMCC must wait before activating or deactivating the controlled output.

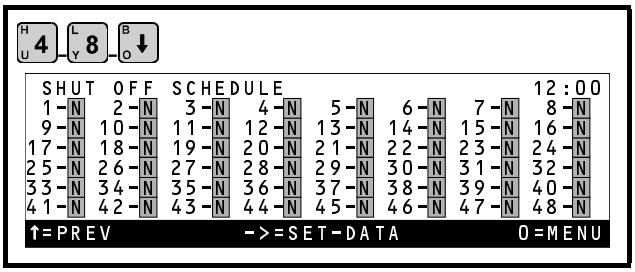
11.5.5. Shut Off Schedule 1



A Scheduled Override bypasses normal sensor operations according to the schedule defined at the Shut Off Schedule 1 screen. The defined override schedule is activated when assigned to selected sensors at the Shut Off Schedule 2 screen.

To define the schedule override, enter the schedule start day and time in the FROM field and the schedule stop day and time in the UNTIL field. Fixed, timed, and manual overrides are configured at the Alarm Overrides screen (see **Section 14.5.,** *Alarm Overrides*).

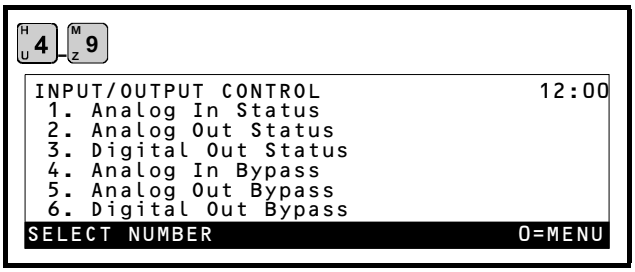
11.5.6. Shut Off Schedule 2



The override schedule defined at the Shut Off Schedule 1 screen is activated when assigned to selected sensors at the Shut Off Schedule 2 screen.

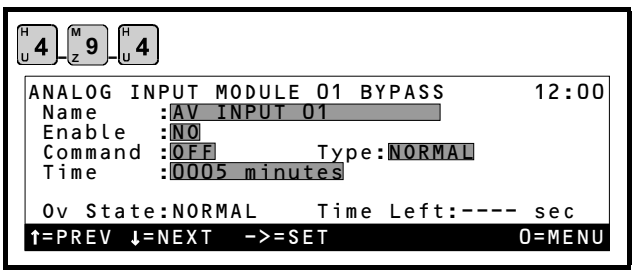
To activate the schedule within selected sensors, find the desired Sensor Numbers and enter “Y”es in the corresponding fields.

11.5.7. Input/Output Control



Item	Description	Page
1	Analog In Status	13-9
2	Analog Out Status	13-9
3	Digital Out Status	13-10
4	Analog In Bypass	11-49
5	Analog Out Bypass	11-50
6	Digital Out Bypass	11-51

11.5.8. Analog Input Module Bypass


HU 4 MZ 9 HU 4
ANALOG INPUT MODULE 01 BYPASS 12:00
Name :AV INPUT 01
Enable :NO
Command :OFF Type:NORMAL
Time :0005 minutes
Ov State:NORMAL Time Left:---- sec
↑=PREV ↓=NEXT ->=SET 0=MENU

The Command output of the Analog Input Module may be overridden using this screen.

Name [15 characters max] [AV INPUT {module number}]

If desired, enter a name for the analog input module in the Name field.

Enable [Yes, No] [N]

The Enable field allows users to turn an individual Analog Input Module on or off without having to use UltraSite. Entering Yes in this field enables the current module; entering No in this field turns off the module.

Command [OFF, ON, NONE] [OFF]

The value to which the Command output will be overridden is entered in the Command field.

Type [Fixed, Timed, Normal] [Normal]

In the Type field, users may choose the type of override. There are three override types to choose from:

- *Normal* - Choosing "Normal" in the Type field ends a fixed or timed override already in progress.
- *Fixed* - The output will be overridden to the value chosen in the Command field until the user returns to this field and selects "Normal".
- *Timed* - The output will be overridden to the value chosen in the Command field for the amount of time entered in the Time field (see below). This override may also be terminated by selecting "Normal" in the Command field.

Time [0 - 68 minutes] [5 minutes]

The value entered in the Time field will be the number of minutes a timed override will last.

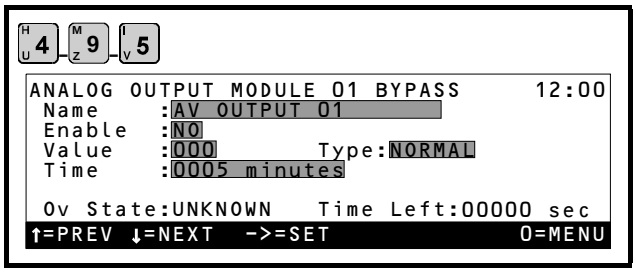
Ov State

The Ov State is a read-only field that shows the current state of the Command override (either Fixed, Timed, or Normal).

Time Left

The Time Left field is a read-only field showing the amount of time left in a timed override. When no timed override is being carried out, the Time Left field will display a row of dashes.

11.5.9. Analog Output Module Bypass



The Value output of the Analog Output Module may be overridden using this screen.

Name [15 characters max] [AV OUTPUT {module number}]

If desired, enter a name for the analog output module in the Name field.

Enable [Yes, No] [N]

The Enable field allows users to turn an individual Analog Output Module on or off without having to use UltraSite. Entering Yes in this field enables the current module; entering No in this field turns off the module.

Value [0 - 100] [0]

The value to which the Value output will be overridden is entered in the Command field.

Type [Fixed, Timed, Normal] [Normal]

In the Type field, users may choose the type of override. There are three override types to choose from:

- *Normal* - Choosing "Normal" in the Type field ends a fixed or timed override already in progress.
- *Fixed* - The output will be overridden to the value chosen in the Value field until the user returns to this field and selects "Normal".
- *Timed* - The output will be overridden to the value chosen in the Value field for the amount of time entered in the Time field (see below). This override may also be terminated by selecting "Normal" in the Command field.

Time [0 - 68 minutes] [5 minutes]

The value entered in the Time field will be the number of minutes a timed override will last.

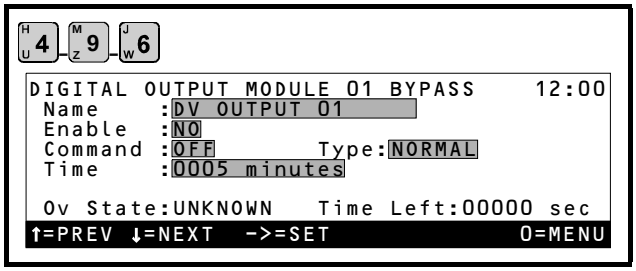
Ov State

The Ov State is a read-only field that shows the current state of the Value override (either Fixed, Timed, or Normal).

Time Left

The Time Left field is a read-only field showing the amount of time left in a timed override. When no timed override is being carried out, the Time Left field will display a row of dashes.

11.5.10.Digital Output Module Bypass



The Value output of the Analog Output Module may be overridden using this screen.

Name [15 characters max] [DV OUTPUT {module number}]

If desired, enter a name for the digital output module in the Name field.

Enable [Yes, No] [N]

The Enable field allows users to turn an individual Digital Output Module on or off without having to use UltraSite. Entering Yes in this field enables the current module; entering No in this field turns off the module.

Command [OFF, ON, NONE] [OFF]

The value to which the Command output will be overridden is entered in the Command field.

Type [Fixed, Timed, Normal] [Normal]

In the Type field, users may choose the type of override. There are three override types to choose from:

- *Normal* - Choosing “Normal” in the Type field ends a fixed or timed override already in progress.
- *Fixed* - The output will be overridden to the value chosen in the Value field until the user returns to this field and selects “Normal”.
- *Timed* - The output will be overridden to the value chosen in the Value field for the amount of time entered in the Time field (see below). This override may also be terminated by selecting “Normal” in the Type field.

Time [0 - 68 minutes] [5 minutes]

The value entered in the Time field will be the number of minutes a timed override will last.

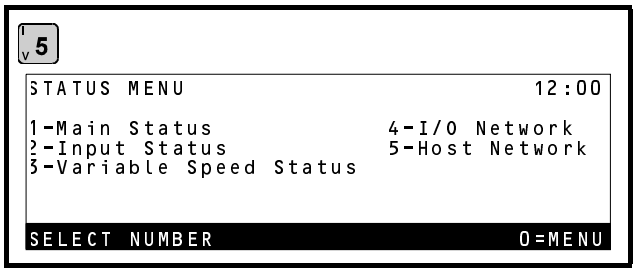
Ov State

The Ov State is a read-only field that shows the current state of the Command override (either Fixed, Timed, or Normal).

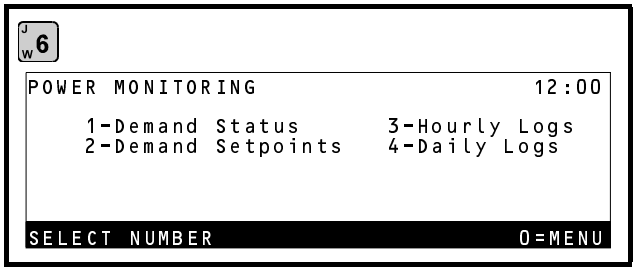
Time Left

The Time Left field is a read-only field showing the amount of time left in a timed override. When no timed override is being carried out, the Time Left field will display a row of dashes.

11.6. Main Status

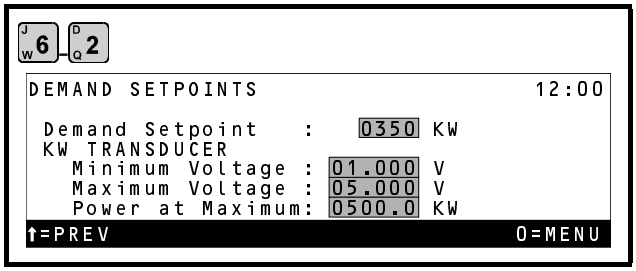


11.7. Power Monitor



Item	Description	Page
1	Demand Status	13-10
2	Demand Set Points	11-52
3	Hourly Logs	12-2
4	Daily Logs	12-2

11.7.1. Demand Set Points



Demand Set Points are defined at the Demand Setpoints screen.

Demand Setpoint [0 - 9999]

Enter the appropriate demand limit set point in kilowatts in the Demand Setpoint field. If the power usage exceeds this set point, the RMCC will activate a closure in the demand relay. A demand relay must be configured at the Output Definitions screen (see Section 11.8.2. Output Definitions).

kW Transducer

To calculate the current energy consumption, kW transducers read the actual kW and send a voltage range defined by a minimum and maximum voltage.

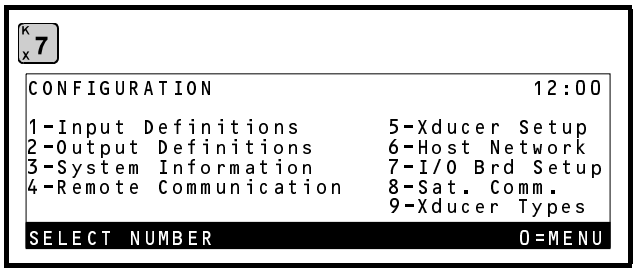
Maximum and Minimum Voltage [0 - 12]

Enter the minimum and maximum voltage sent by the kW transducer in the appropriate fields.

Power at Maximum [0 - 3200]

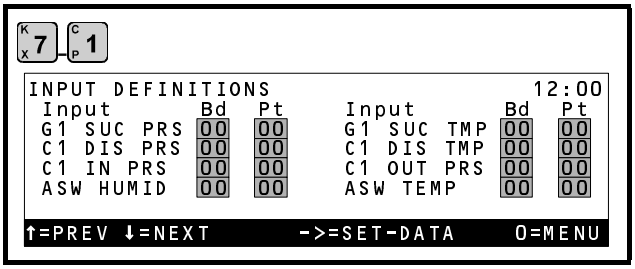
To translate the voltage reading into a kW reading correctly, the RMCC requires the kW reading when the maximum voltage is being supplied. Enter the kW value in the maximum voltage in the Power at Maximum field. The RMCC assumes the minimum voltage represents a value of zero.

11.8. Configuration



Item	Description	Page
1	Input Definitions	11-53
2	Output Definitions	11-54
3	System Information	11-55
4	Remote Communication	11-59
5	Transducer Setup	11-61
6	Host Network	11-62
7	I/O Board Setup	11-63
8	Satellite Communication	11-64
9	Xducer Types	11-64

11.8.1. Input Definitions


K X 7
C P 1
INPUT DEFINITIONS 12:00
Input Bd Pt Input Bd Pt
G1 SUC PRS 00 00 G1 SUC TMP 00 00
C1 DIS PRS 00 00 C1 DIS TMP 00 00
C1 IN PRS 00 00 C1 OUT PRS 00 00
ASW HUMID 00 00 ASW TEMP 00 00
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

All inputs connected to the 16AI or 8IO boards are configured at the Input Definitions screen. Each input is identified according to its board and point address.

Bd [1 - 20]

The network address of an input communication board is defined by the network dip switch on the 16AI board or rotary dials on the 8IO board. The number entered in the Board Number field is used by the RMCC in conjunction with the Point address defined below to locate the selected sensor.

Pt [1 - 16]

Each input sensor is physically connected to a specific point on an input communication board. The point numbers are printed on the board above the input connections. This point address is used by the RMCC in conjunction with the board address to locate the selected sensor.

Table 11-5 shows the specific inputs in the order they appear within the Input Definitions screens.

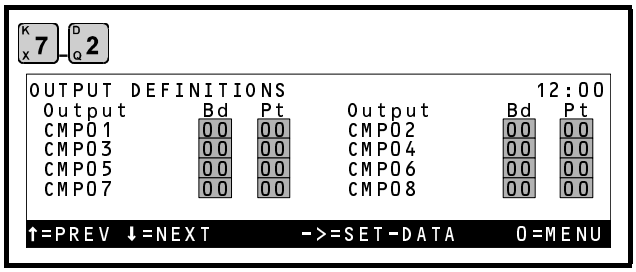
Input Name	Input Description
G1 SUC PRS	Group 1 Suction Pressure.
G1 SUC TMP	Group 1 Suction Temperature.
C1 DIS PRS	Condenser Discharge Pressure.
C1 DIS TMP	Condenser Discharge Temperature.
C1 IN PRS	Condenser Inlet Pressure.
C1 OUT PRS	Condenser Outlet Pressure.
ASW HUMID	Anti-Sweat Relative Humidity sensor.
ASW TEMP	Anti-Sweat Temperature sensor.
G2 SUC PRS	Group 2 Suction Pressure.
G2 SUC TMP	Group 2 Suction Temperature.
ASW OVRD#1-#4	Anti-sweat override #1 through #4.
G3 SUC PRS	Group 3 suction pressure.
G3 SUC TMP	Group 3 suction temperature.
ASW OVRD#5-#8	Anti-Sweat override #5 through #8.
G4 SUC PRS	Group 4 suction pressure.
G4 SUC TMP	Group 4 suction temperature.
C1 EVAP 1-5	Condenser evaporative cooling sensor 1 through 5.
C1 INV ALM	Condenser inverter alarm.
PHASE LOSS	A contact closure from a phase monitor will cause the RMCC to turn off all loads.
KW ANALOG	Kilowatt analog input from the watt-hour transducer.
C1 IN TMP	Condenser inlet temperature.
C1 OUT TMP	Condenser outlet temperature (used if temperature strategy is selected for condenser control).
AMBIENT	Ambient (outside) temperature input.
C1 RCL STA	A contact closure when the system goes into reclaim can be programmed to force condenser split or to raise the discharge pressure set point.

***Table 11-5** - List of Inputs Configurable at the Input Definitions Screens*

Input Name	Input Description
SUCT SETUP	A contact closure will raise the suction set point by a pre-programmed amount.
DEFR INH 1-DEFR INH 4	A contact closure will inhibit the selected suction group from floating the suction set point.
CHECK IT	Checkit sensor location.
HUMIDITY	Humidity sensor location.
C1 F1 PRF- C1 F12 PRF	A contact closure from contacts on fans 1 - 12 will prove the fans are working.
OIL PRES01-OIL PRES22	Oil pressure transducer inputs OR Copeland Oil System inputs for compressors 1 - 22
CMP01 PRF-CMP22 PRF	A contact closure from contacts on compressors 1 - 22 will prove the compressors are working.
SENS01-SENS48	Inputs for sensors 1 - 48.
VS1 INVALM-VS4 INVALM	A contact closure from an inverter signifies an inverter fault.
ALARM OVD1-ALARM OVD8	A contact closure activates a sensor alarm override for either a fixed or timed duration.
ALL SCH ON	A contact closure activates all lighting schedules.
ALL SCH OFF	A contact closure deactivates all lighting schedules.
SCH 1 OVRD-SCH 4 OVRD	A contact closure bypasses schedules 1, 2, 3, and/or 4.
01 CLEANSW-48 CLEANSW	Clean switches for circuits 01 - 48.
01 EXTRA- 48 EXTRA	Also known as the Dual Temp input, a contact closure from this input may be used to raise the case temperature alarm set point for a dual temp case.
01 TEMP # - 48 TEMP #	Case temperature sensors 1-6 for circuits 01 - 48.
01 TERM #- 48 TERM #	Termination temperature sensors 1 - 6 for circuits 01 - 48.
01 DEMAND#-48 DEMAND#	Demand defrost sensors 1 and 2 for circuits 01 - 48.

***Table 11-5** - List of Inputs Configurable at the Input Definitions Screens*

11.8.2. Output Definitions


K 7
D 2
OUTPUT DEFINITIONS
12:00
Output Bd Pt Output Bd Pt
CMP01 00 00 CMP02 00 00
CMP03 00 00 CMP04 00 00
CMP05 00 00 CMP06 00 00
CMP07 00 00 CMP08 00 00
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

All outputs connected to the 8RO, 8RO Form C, 4AO, 8DO or 8IO boards are configured at the Output Definitions screen. Each output is identified according to its board and point address.

Bd [1 - 20]

The network address of an output communication board is defined by the network dip switch on the 8RO boards or rotary dials on the 8IO board. The number entered in the Board Number field is used by the RMCC in conjunction with the Point address defined below to locate the selected output.

Pt [1 - 8]

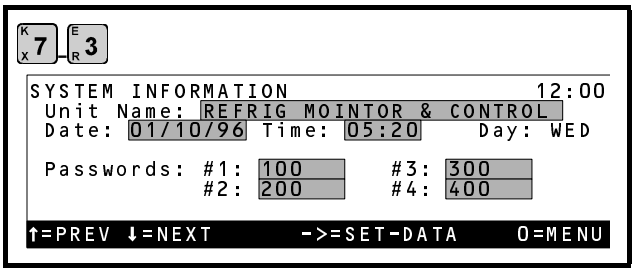
Each output is physically connected to a specific point on an output communication board. The point numbers are printed on the board above the output connections. This point address is used by the RMCC in conjunction with the board address to locate the selected output.

Table 11-6 shows the specific outputs as they appear in the Output Definitions screens.

Output Name	Output Definition
CMP01 - CMP22	Compressors 1 - 22.
ALARM	Output closes when an any alarm occurs.
DEMAND	Closes when power usage exceeds demand set point.
SUBCOOLER	Closes if a compressor is on in group 1 to turn on a subcooler.
MASTER LLS	Master liquid line solenoid.
C. FAN #01 - C. FAN #12	Condenser fans 1 - 12.
C1 SPLIT 1 - C1 SPLIT 2	Both contacts close when a condenser split is called for.
SEN CTL 01 - SEN CTL 48	Controlled sensor outputs for sensors 01 - 48.
VS1 ALARM - VS4 ALARM	Contacts close when an inverter fault condition occurs (see Section 11.2.11. Group 1 Variable Speed Set Points).
INV1 RESET - INV4 RESET	Inverter reset contacts (see Section 11.2.11. Group 1 Variable Speed Set Points).
SCHEDULE 1 - SCHEDULE 4	Activates and deactivates case lights that follow one of the four schedules.
GRP1 LLS - GRP4 LLS	Master liquid line (hot gas) solenoid for suction groups 1 - 4.
CRCT01 DFR - CRCT48 DFR	Defrost for circuits 01 - 48.
CRCT01 RFR - CRCT48 RFR	Refrigeration solenoid for circuits 01 - 48.
CRCT01 FAN - CRCT48 FAN	Case fans for standard circuits 01 - 48.
ASW 1 - ASW 8	Anti-Sweat heaters 1 through 8.
VS COMP 1 - VS COMP 4	Variable-speed compressors for groups 1 through 4.
C1 VS FAN	Condenser variable-speed fan.
C1 VS ALM	Inverter alarm output for variable-speed condenser fan.
C1 INV RST	Inverter reset output for variable-speed condenser fan.
C1 FAN CON	Condenser two-speed fan contact.
C1 2S REL1 - C1 2S REL2	Condenser two-speed fan relay #1 and #2.

Table 11-6 *- List of Outputs Configurable at the Output Definitions Screens*

11.8.3. System Information



General information such as defining RMCC identifiers, the power up self-test, summer and winter start dates, and user passwords is defined at the RMCC System Information screens. The System Information screen is the first of six screens where such information is entered.

Unit Name [25 Character Limit]

The Unit Name is a user-defined identifier that is used to identify the specific RMCC on modification and status screens within UltraSite™. Enter a unique name in the Unit Name field.

Date/Time/Day [01/01/00 - 12/31/99] [00:00 - 24:00]

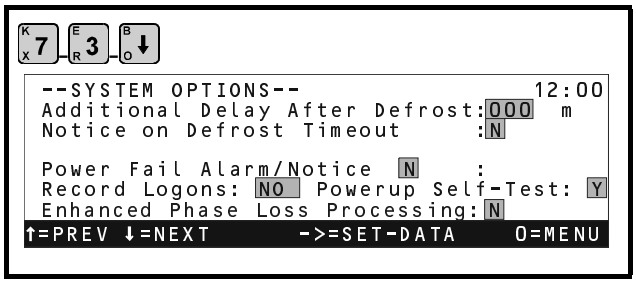
The RMCC contains a real-time clock that is used when logging information to the various logging screens. It is important that the system date and time be accurate. Many RMCC applications use the system date and time to record important information. To set this clock, enter the current date and time in the Date and Time fields. The RMCC will automatically set the Day for the entered Date.

Passwords [6 Character Limit]

Choose a different password for each level of access. If all passwords are defined the same, users will only be able to log in at 100-level access.

The RMCC system requires a password for all users to enter into and modify the system. There are four levels of access to the RMCC. A detailed description of each access level is given in **Table 11-1** on Section 11.1. Log On. To change the passwords, enter the desired password in each password level field. After a new password is defined, it may be used to log into the system at the corresponding level access.

11.8.4. System Options


--SYSTEM OPTIONS--
12:00
Additional Delay After Defrost:000 m
Notice on Defrost Timeout :N
Power Fail Alarm/Notice N :
Record Logons: NO Powerup Self-Test: Y
Enhanced Phase Loss Processing: N
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Additional Delay After Defrost [0 - 240 minutes] [0]

When the RMCC exits a stage of defrost, the RMCC will wait a specified Defrost Delay before reactivating alarms.

Notice on Defrost Timeout [(Y)es, (N)o] [N]

Some circuits may be set up with defrost termination strategies that cause them to exit defrost when a certain Termination Temperature is exceeded within the case. Regardless of strategy or termination temperature, a circuit will operate in defrost mode no longer than the defined Defrost Duration.

Power Fail Alarm/Notice [(A)larm, (N)otice] [N]

The RMCC will generate a notice or an alarm when there is a power failure within the system. A notice is a low-level warning that alerts users of abnormal facility or control system conditions. A notice creates an entry in the RMCC Alarm Log. An alarm is a high-level warning that also alerts users of abnormal facility or control system conditions. An alarm will appear in the RMCC Alarm Log and may be accompanied by a contact closure for on-site operation of a bell, light, horn, etc. An alarm may also initiate an alarm dialout sequence and/or the activation of the 485 Alarm Annunciator Panel.

Record Logons [(Y)es, (N)o] [N]

The Record Logons feature configures the RMCC to record the password level of users logging into the controller. When Record Logons is activated, the RMCC will send a notice to the RMCC Alarm Log each time a users logs onto the RMCC from the front panel or through a remote connection. Included in the log entry is the date, time, and password level.

Powerup Self-Test [(Y)es, (N)o] [Y]

It is recommended that the CRC test be enabled to provide a method for ensuring that the controller operating program has not been corrupted.

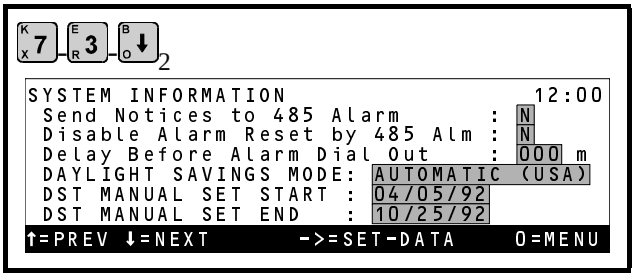
A power-up self test—also called a Cyclic Redundancy Check (CRC)—is a self-diagnostic the controller performs during system startup. This test validates that the program running in the REFLECS controller has not been corrupted. The CRC test searches the entire operating program and validates that the current values are the same as were originally uploaded. This test takes approximately one minute to complete.

Should the CRC test fail, contact the CPC Service Department for further information.

Enhanced Phase Loss Processing[(Y)es, (N)o] [N]

This is a special application in the RMCC and should not be activated unless you call CPC.

11.8.5. System Information


7 3 2
SYSTEM INFORMATION 12:00
Send Notices to 485 Alarm : N
Disable Alarm Reset by 485 Alm : N
Delay Before Alarm Dial Out : 000 m
DAYLIGHT SAVINGS MODE: AUTOMATIC (USA)
DST MANUAL SET START : 04/05/92
DST MANUAL SET END : 10/25/92
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Send Notices to 485 Alarm [(Y)es, (N)o] [N]

To send generated notices to the 485 Alarm Panel in addition to generated alarms, enter "Y"es in the Send Notices to 485 Alarm Panel field.

Disable Alarm Reset by 485 Alm [(Y)es, (N)o] [N]

To deactivate this feature, enter "Y"es in the Disable Alarm Reset by 485 Alm field.

Delay Before Alarm Dial Out [0 - 240 minutes] [0]

RMCC alarms are usually accompanied by an alarm dialout sequence. The time delay for the dialout is defined in the Delay Before Alarm Dial Out field. The Dialout Time Delay is the amount of time in minutes the unit must wait before activating the call-out sequence. The delay allows an on-site user to acknowledge the alarm, thereby cancelling the dialout.

DAYLIGHT SAVINGS MODE [(1) Auto, (2) Manual, (3) None] [Auto]

The RMCC contains a real-time clock that is used when logging information to the various logging screens. When the current time changes to standard time or to daylight saving time, the RMCC's clock should be modified accordingly. Time changes occur twice a year in most areas. Methods for defining how the system will change its settings for daylight savings time are defined in the DAYLIGHT SAVINGS MODE field.

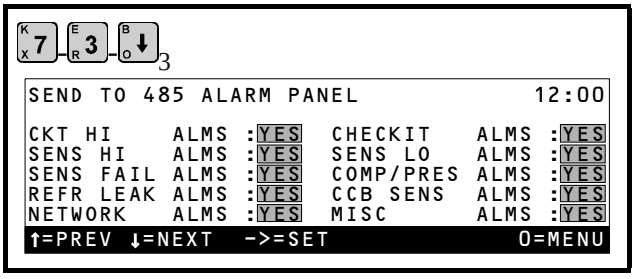
The clock may be configured to change according to the standard USA Daylight Savings Time dates, according to a user-defined date, or for areas that do not participate in daylight savings time, the clock will not be modified.

DST MANUAL SET START [01/01/00 - 12/31/99] [04/05]/ DST MANUAL SET END [01/01/00 - 12/31/99] [10/25]

If the Manual method is chosen in the DAYLIGHT SAVINGS MODE field, the RMCC will modify the system time on the specified dates. RMCC system settings will be changed to daylight savings time starting on the date defined in the DST MANUAL SET START field, and will return to standard time on the date defined in the DST MANUAL SET END field. System time changes at approximately 2:00 a.m.on the dates specified.

Because the defined dates are specific for each year, the Date fields must be updated each year by the user.

11.8.6. Send to 485 Alarm Panel


7 3 3
SEND TO 485 ALARM PANEL 12:00
CKT HI ALMS :YES CHECKIT ALMS :YES
SENS HI ALMS :YES SENS LO ALMS :YES
SENS FAIL ALMS :YES COMP/PRES ALMS :YES
REFR LEAK ALMS :YES CCB SENS ALMS :YES
NETWORK ALMS :YES MISC ALMS :YES
↑=PREV ↓=NEXT ->=SET 0=MENU

If a Send Notices to 485 Alarm Panel field is set to YES, both alarms and notices for the alarm types within the category will be filtered. Users may keep notices from being sent to the panel by setting the Send Notices field in Section 11.8.5. to "N".

Using the Send to 485 Alarm Panel screen, users may choose which alarm types to send to the 485 Alarm Panel. Alarm types within a category marked with a YES will be sent to the 485 Alarm Panel; alarm types within a category marked with a NO will not be sent to the alarm panel.

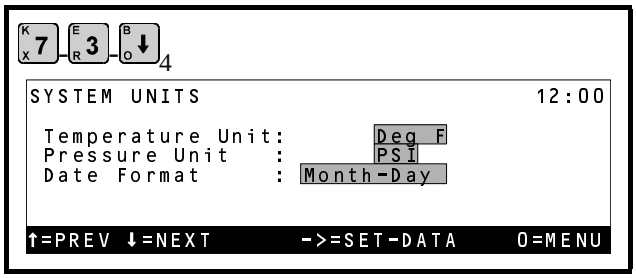
The ten different alarm filter categories and the alarm types within each category are listed below. For additional information on alarm types, see Table 14-1 on page 5.

- *Ckt Hi (Circuit High)* - This alarm type includes the Hi Temp and Hi Avg Temp alarms.
- *Checkit* - This alarm type includes the Check System Now and Check System Soon alarms.
- *Sens Hi (Sensor High)* - This alarm type includes the Hi Sens and Hi X-Ducer alarms generated by Sensor Control.
- *Sens Lo (Sensor Low)* - This alarm type includes the Lo Sens and Low Avg Temp alarms generated by sensor control.
- *Sens Fail (Sensor Fail)* - This alarm type includes the IRLDS Fault, Sensor Fail, Sensor Short, Sensor Open, Xducer Short, and Xducer Open alarms.

- *Comp/Pres (Compressor/Pressure Alarms)* - This alarm type includes the Auto-Reset, Discharge Tripped, Hi Suction, and Oil Pressure alarms.
- *Refr Leak (Refrigerant Leak)* - This alarm type includes the Leak alarm.
- *CCB Sens (CCB Sensors)* - This alarm type includes the Coil In, Coil Out, Coil2 In, and Coil2 Out alarms.
- *Network* - This alarm type includes the Bad Checksum, Bad Message, Device ONLINE, Host Bus Network Down, Missed Token, and No Response alarms.
- *Miscellaneous* - This alarm type includes all other alarm messages not covered in the first nine categories. These include the Condenser VS Fan Proof, Condenser VS Inv Fail, Defr Timed, Demand TimeOut, Dialout Unsuccessful, Dig. Alarm Override ON, Fan Proof, FP Level <999> Login, High Speed Proof, Hi Humidity, Hi Term, In Override, Inverter Fail, Lo Suction, Lo Xducer, Low Humidity, Low Speed Proof, Low Temp, Low Term, Manual Alarm Ovrride ON, Manual Defr, Manual Term, Ovrd Active, Ovrrd, Phase Fail, Phase Restored, Power Failed, Power Restored, Proof Fan <99>, Proof Failure, Pump Down, RM Level <999> Login, Reset, Run Proof, Sensor Open, Sensor Short, Setpoints Corrupted, Setpoint Restore Error, Xducer Open, Xducer Short, alarms.

  The Miscellaneous alarm type also includes all Hi and Lo alarms generated by Analog Input Modules.

11.8.7. System Units



Engineering units used throughout the RMCC are defined at the System Units screen.

Temperature Unit [Deg C, Deg F] [Deg F]

Temperature units may be shown in degrees Celsius or degrees Fahrenheit. For degrees Fahrenheit enter an “F”. For degrees Celsius enter a “C”.

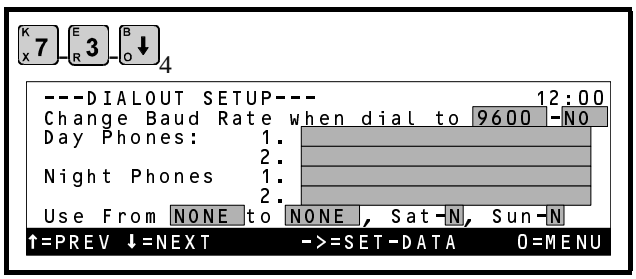
Pressure Unit [(P) PSI, (B) BAR] [P]

Pressure units may be shown in PSI or Bars. Pressing “P” while in the Pressure Unit field will display pressures in PSI. Pressing “B” while in the Pressure Unit field will display pressures in Bars.

Date Format [(0) Month-Day, (1) Day-Month] [0]

To display dates in the month/day/year format press “0” while in the Date Format field. To display dates in the day/month/year format press “1” while in the Date Format field.

11.8.8. Dialout Setup



RMCC alarms, or high level warnings, are usually accompanied by an alarm dialout sequence. This sequence is setup at the Dialout Setup screen.

Change Baud Rate when dial to [(3)00, (1)200, (2)400, (9)600] [9]

The baud rate of the dialout modem is specified in the Communications Setup screen shown on Section 11.8.10. Communications Setup. The baud rate specified in the Communications Setup screen is the default baud rate used when the RMCC dials out. If the device receiving the dialout cannot read data at the default baud rate, select the baud rate used by the modem being dialed and select “Y”es in the toggle field.

Day Phones/Night Phones [Enter Number, (T) for Tone Dial]

Phone numbers to be called when an alarm is generated are defined in the Day and Night Phones fields. Phone numbers for daytime dialouts as well as nighttime dialouts

must be defined in these fields to activate the remote dialout function.

When an alarm is generated, and after the dialout delay, the dialout sequence begins. If the remote line is busy or there is no answer, the system will dial the first number six times, waiting five minutes before each attempt, until a connection is made. If no connection is made, the system will dial the Day or Night Phones Two number six times, waiting five minutes before each attempt. If there is still no connection, the system will generate an additional alarm in the RMCC Alarm Log and cease dialout.

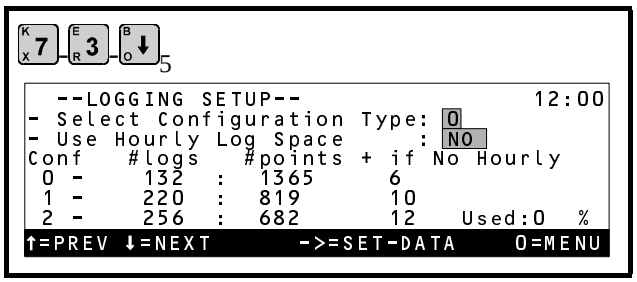
Use From [00:00 - 23:59, (N)one] [N]

To specify when the RMCC should use defined Night phone numbers instead of Day phone numbers, enter the start and end night times in the Use From fields.

Sat/Sun [(Y)es, (N)o]

To activate the RMCC's alarm dialout feature on Saturday and Sunday, enter "Y"es in the Sat and Sun fields.

11.8.9. Logging Setup


7
3
5
--LOGGING SETUP-- 12:00
- Select Configuration Type: 0
- Use Hourly Log Space : NO
Conf #logs #points + if No Hourly
0 - 132 : 1365 6
1 - 220 : 819 10
2 - 256 : 682 12 Used:0 %
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

The RMCC periodically records data to RMCC Logs according to Input and Output Logging Intervals defined within the RMCC. These logs are configured at the Logging Setup screen.

Select Configuration Type [See Table] [0]

There is a limited amount of logging space within the RMCC; therefore, the available number of logging points is determined by the number of logs the RMCC is configured to generate. Each Input or Output Logging Interval defined within the RMCC represents a log. Select the appropriate Log Configuration according to the number of defined logs in the Select Configuration Type field. Users may choose from the configuration types displayed in the following table.

Configuration Type	Number of RMCC Logs	Available Logging Points	Available Logging Points w/o Hourly Log
0	132	1365	1371
1	220	819	829
2	256	682	694

***Table 11-7** - Logging Strategies*

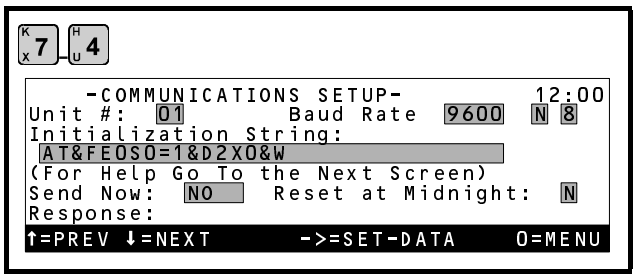
Use Hourly Log Space [(Y)es, (N)o] [N]

To activate the RMCC Demand Control Hourly Log, enter "Y"es in the Use Hourly Log Space field. Deactivating this log by entering "N"o in the Use Hourly Log Space field will add logging points to other logs generated within the RMCC, as shown in **Table 11-7**. If the Hourly Log is deactivated, the RMCC Demand Control Hourly Log will not be generated.

Used

The percentage of log space currently being used within the RMCC is displayed in the Used field. Users may not exceed 100%.

11.8.10.Communications Setup



The remote communication capability within the RMCC allows the user to communicate with a site from a remote location. Remote communication with a site controlled by the RMCC is accomplished using UltraSite™, CPC's remote communication software package. To use this RMCC function, the communication network must be connected to a modem (some systems may require that a RS232 Bus Amplifier be installed before the modem in the communication line).

Remote communication network settings are defined at the Communications Setup screen.

Unit # [1 - 38]

The Unit Number for each RMCC is the number UltraSite uses to determine the specific RMCC controller from which information is being received. No two REFLECS controllers may have the same Unit number.

For the specified RMCC to communicate properly with the remote communication software, the Unit Number must be entered in the Unit # field.

Baud Rate [(3)00, (1)200, (2)400, (9)600] [9]

Most standard Hayes compatible modems with a baud rate of at least 9600 will operate properly with the RMCC network. The baud rate should be set according to the type network modem used with the remote network. Refer to the modem user's manual for specific baud rate information.

Parity [(N)one, (O)dd, (E)ven][N]/Data Bits [7 or 8] [8]

The following two fields represent the Parity and Data Bits values. The RMCC automatically calculates the appropriate settings required for the remote network to communicate properly according to the specified baud rate settings. Refer to the modem user's manual for specific Parity and Data Bits information.

Initialization String [Enter String]

Modems are initiated by receiving an attention code followed by the appropriate command or set of commands the modem should implement. This command set, or initialization string, is different for most modem vendors. The initialization string for the modem operating within the remote network is defined in the Initialization String field.

The RMCC stores modem settings for several frequently used types of modems. Initialization strings for these modems may be copied to the Initialization String field at the Modem Initialization screen (see Section 11.8.11. Modem Initialization).

Send Now [(Y)es, (N)o] [N]/Response

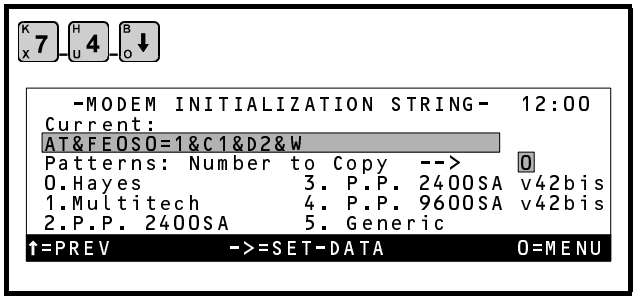
To program the modem, initialize the modem by sending the initialization string to the modem in the Send Now field. The modem's response will be displayed in the Response field. The modem should initialize within approximately five seconds after the string is sent. An OK response or a replica of the string is returned to the screen if the modem is properly defined. If a No Response is returned, check the wiring, resend the string, then refer to the troubleshooting guide in the modem user's manual for suggestions.

Reset at Midnight [(Y)es, (N)o] [N]

To ensure the modem is properly programmed to perform the RMCC's remote communication functions, send the string to program the modem on a regular basis. To automatically send the string every night at midnight, select "Y"es in the Reset at Midnight field.

Only one controller in the network chain should be configured to reset the modem at midnight. If more than one controller is configured to reset the modem at midnight, communication errors can occur.

11.8.11.Modem Initialization

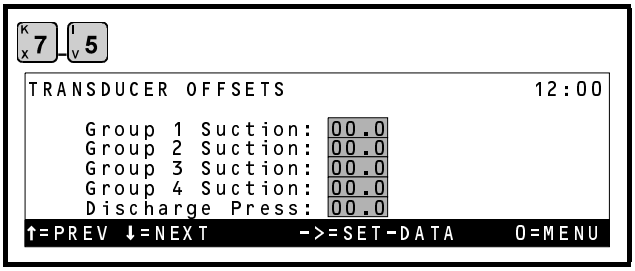


CPC supplies a standard 9600 baud modem for use with the RMCC RS232 COM C network; however, most standard modems with a baud rate of at least 9600 are sufficient. The RMCC stores communication settings for modems frequently used with RMCC. The following modem types are available:

- Hayes
- Multitech
- Practical Peripheral 2400SA
- Practical Peripheral 2400SA V42bis
- Practical Peripheral 9600SA V42bis
- Generic

To copy the stored initialization strings for one of the listed modem types to the Communications Setup screen, enter the corresponding number in the Patterns: Number to Copy field. Refer to the modem user's manual to determine the correct modem type. The stored initialization string for the selected modem type is displayed in the Current field.

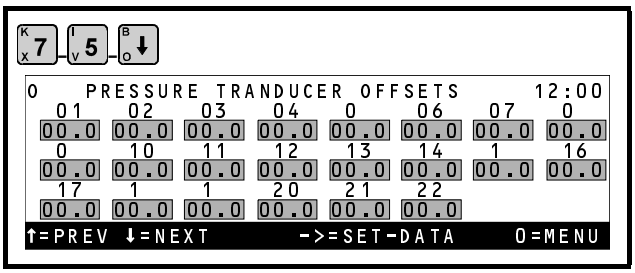
11.8.12.Transducer Offsets



Pressure transducers within the RMCC measure the current suction pressure, discharge pressure, and/or oil pressure within each suction group. Transducer configurations are defined at the Transducer Setup screens.

At times, transducers within suction groups may provide readings that read lower or higher than the known condition being monitored. An offset value may be entered for each defined transducer at the Transducer Offsets screen to calibrate the sensor to actual conditions **[-99 - 99 lb.] [0]**.

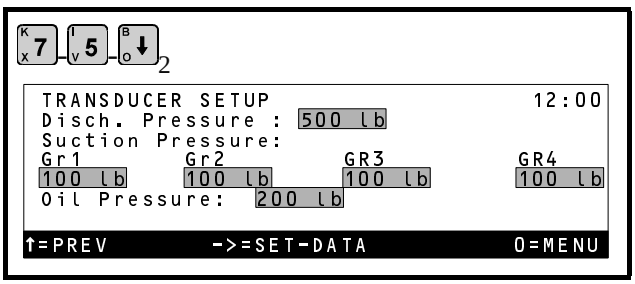
11.8.13.Oil Pressure Transducer Offsets



Pressure transducers within the RMCC measure the current suction pressure, discharge pressure, and/or oil pressure within each suction group. Transducer configurations are defined at the Transducer Setup screens.

Oil pressure transducers monitor the oil pressure within each of the twenty-two available compressor stages. At times, transducers within the RMCC may provide readings that read lower or higher than the known condition being monitored. An offset value may be entered for each defined oil pressure transducer within each compressor stage at the Oil Pressure Transducer Offset screen to calibrate the sensor to actual conditions **[-99 - 99 lb.] [0]**.

11.8.14.Transducer Setup



Discharge, suction, and oil pressure transducers monitoring the RMCC are configured at the Transducer Setup screen.

Discharge Pressure [(2)00, (5)00 lb.] [5]

The transducer type defined within the RMCC to monitor discharge pressure is selected in the Discharge Pressure field.

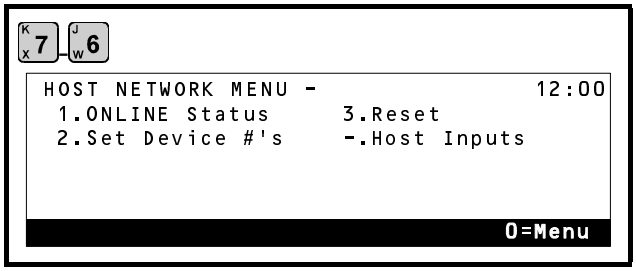
Suction Pressure [(1)00, (2)00, (5)00 lb.] [1]

Suction transducers may be set up for each suction group defined within the RMCC. The transducer type defined to monitor suction pressure is selected in the Suction Pressure Group fields.

Oil Pressure [(2)00, (5)00 lb.] [2]

The transducer type defined within the RMCC to monitor oil pressure is selected in the Oil Pressure field.

11.8.15.Host Network

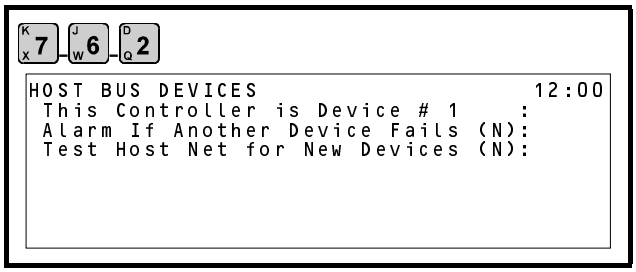


Item	Description	Page
1	On-Line Status	11-62
2	Set Device Numbers	11-62
3	Reset	11-62
—	Host Inputs	11-63

11.8.16.On-Line Status

Refer to the description of the Host Network State in **Section 13.2.5.,** *Host Network Status.*

11.8.17.Set Device Numbers



This Controller is Device # [1 - 16] [1]

Each RMCC must have a defined device number when more than one RMCC is being used. No two RMCCs may have the same device number. If other non-RMCC REFLECS controllers are connected to the host network, each must be identified as well. Device numbering for each REFLECS type always begins with the number 1.

To define a device number for the current RMCC, enter the appropriate device number in the Device # field. RMCC unit numbers should be assigned in numerical order starting with one.

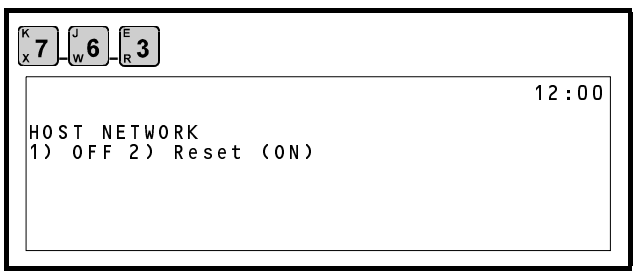
Alarm If Another Device Fails [(Y)es, (N)o] [N]

To activate an alarm if a controller stops communicating, select "Y"es in the Alarm If Another Device Fails field.

Test Host Net for New Devices [(Y)es, (N)o] [N]

The RMCC is capable of searching for any new device defined to the host network. To activate this feature, select "Y"es in the Test Host Net for New Devices field. After all REFLECS controllers have been wired and configured, test each host net for new devices.

11.8.18.Reset

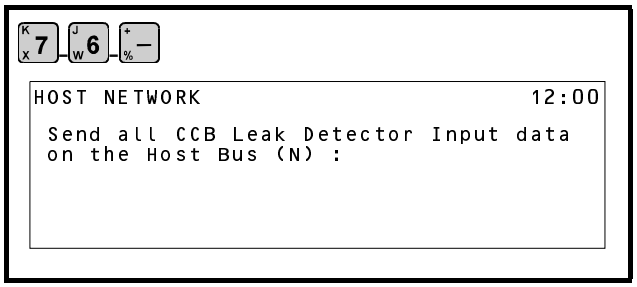


Do not select Reset if a 485 Alarm Panel is not connected to the RMCC through the COM B Host Network.

The host network is, by default, not active within the RMCC. If one or more RMCCs are connected to a 485 Alarm Panel, then the host network should be reset ON at the Reset screen **[(1) Off, (2) Reset On] [1]**.

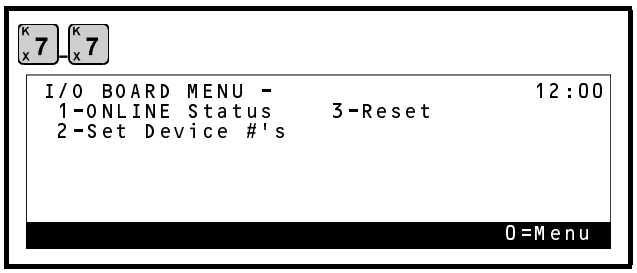
To reset the host network ON within the current RM-CC, select “2” for Reset ON at the Reset screen.

11.8.19.Host Inputs



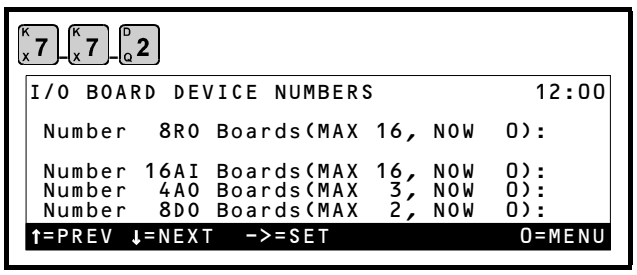
Each CCB has a single input that may be connected to a leak detector. If desired, CCBs can send data from the leak detectors to the RMCC over the Host Bus Network. To enable this feature, enter a “Y” in this field.

11.8.20.I/O Board Setup



Item	Description	Page
1	On-Line Status	13-3
2	Set Device Numbers	11-63
3	Reset	11-64

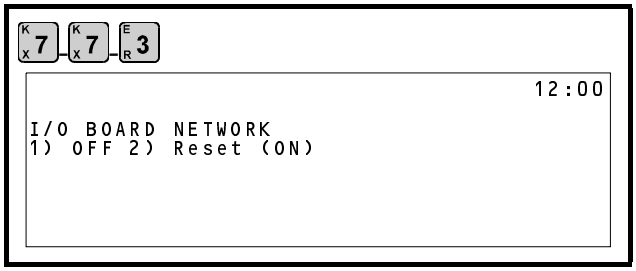
11.8.21.Set Device Numbers


7 7 2
I/O BOARD DEVICE NUMBERS 12:00
Number 8RO Boards(MAX 16, NOW 0):
Number 16AI Boards(MAX 16, NOW 0):
Number 4AO Boards(MAX 3, NOW 0):
Number 8DO Boards(MAX 2, NOW 0):
↑=PREV ↓=NEXT ->=SET 0=MENU

Each RMCC supports up to 16 8RO Boards, up to eight 16AI Boards, up to three 4AO Boards, and up to two 8DO Boards. To define the number of boards connected to the RMCC, enter this number in the corresponding fields at the Set Device Numbers screen. Defining these numbers allows the RMCC to calculate the number of boards within the system. By default, this screen will display the maximum number of 8RO, 16AI, 4AO, and 8DO boards the RMCC may hold, and it displays the current number of boards defined.

When setting up an 8IO in this screen, count the 8IO as one 16AI, one 8RO, and one 4AO board. If the 8IO’s analog output functionality is not being used and the 4AO slot is needed elsewhere on the I/O network, users may remove the 8IO’s functionality to free a 4AO slot. To achieve this, disable the 8IO’s analog outputs by removing the jumper (JU4) (see **Section 2.4.1.,** *8IO Board*) on the 8IO. This board must then be set up as one 8RO and one 16AI in this screen.

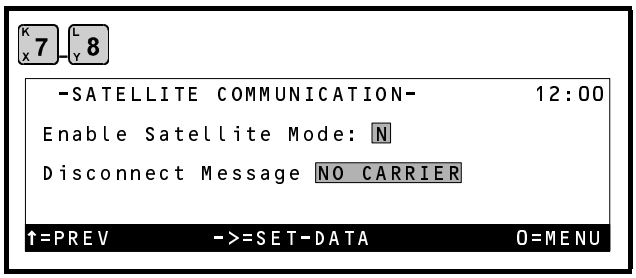
11.8.22.Reset



The I/O Board Network is disabled at the Reset screen. If this network is disabled, the RMCC may no longer control functions associated with the unit. After the network is reset OFF, it may also be reset ON at the Reset screen.

To turn off the I/O Board Network, enter “1” for OFF at the Reset screen. To reset the network ON, enter “2” for Reset ON at the Reset screen **[(1) Off, (2) Reset On] [1]**.

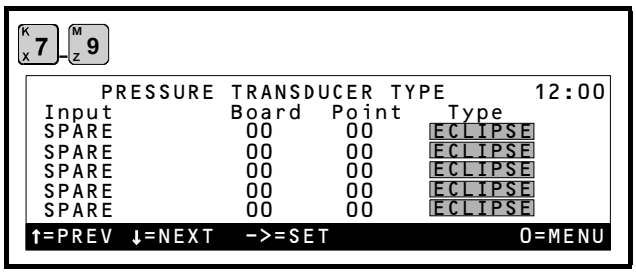
11.8.23.Satellite Communication



The RMCC has the ability to communicate via satellite. The RMCC’s Satellite Communication feature is configured at the Satellite Communication screen.

To enable the RMCC Satellite Communication feature, enter “Y”es in the Enable Satellite Mode field. If the satellite feature is activated, users may enter the appropriate disconnect message in the Disconnect Message field.

11.8.24.Pressure Transducer Type



Before a transducer type may be changed, the transducer input’s board and point address must be entered in the Output Definitions screen (Section 11.8.2. Output Definitions).

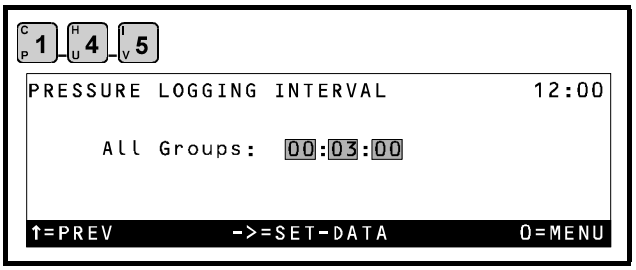
The RMCC is capable of accepting inputs from both standard and Eclipse pressure transducers. The RMCC assumes by default that all transducers set up in the RMCC software are Eclipse transducers. If any standard transducers are being used, the transducer type must be changed in this screen.

The Pressure Transducer Type screen lists all transducer inputs currently set up in the RMCC, along with their board and point numbers. To change the transducer types, scroll through the list using the arrow keys until the desired input is shown. Using the RIGHT arrow key, move the cursor to the input’s Type field and select the desired transducer type **[(0) - Standard, (1) - Eclipse] [1]**.

12 System Logs and Graphs

12.1. Logs

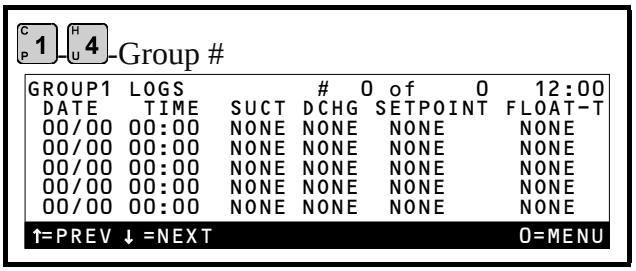
12.1.1. Suction Pressure Log Interval



The Logging Interval defines how often the data within all suction groups are recorded to the Pressure Control logs.

To define the logging interval for all suction group data, enter the time the suction group data should be logged at the Pressure Logging Interval Screen **[00:00:00 - 24:00:00] [00:03:00]**. The number of available logging points is determined by the Logging Configuration defined at the Logging Setup screen (see **Section 11.8.9.,** *Logging Setup*).

12.1.2. Suction Group 1 Logs

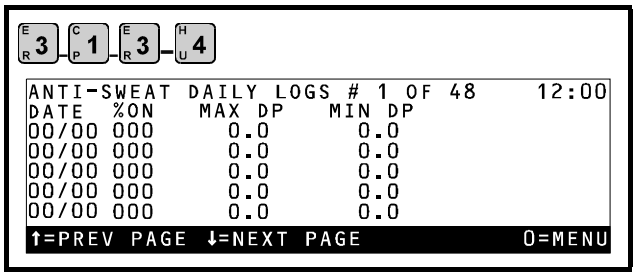

CP 1 - HU 4 -Group #
GROUP1 LOGS # 0 of 0 12:00
DATE TIME SUCT DCHG SETPOINT FLOAT-T
00/00 00:00 NONE NONE NONE NONE
00/00 00:00 NONE NONE NONE NONE
00/00 00:00 NONE NONE NONE NONE
00/00 00:00 NONE NONE NONE NONE
00/00 00:00 NONE NONE NONE NONE
↑=PREV ↓=NEXT 0=MENU

The RMCC continuously records occurrences within each suction group and stores the information in the Pressure Logs. The RMCC records the date, time, and occurrence data based on the logging interval defined at the Log Interval screen (see **Section 12.1.1.,** *Suction Pressure Log Interval*).

Occurrence data points displayed at the Group Logs screens include the Suction Pressure reading, the Discharge reading, the Float Temperature set point, and the Float Temperature reading for each entry.

The number of available logging points is determined by the Logging Configuration defined at the Logging Setup screen (see **Section 12.1.1.,** *Suction Pressure Log Interval*).

12.1.3. Anti-Sweat Daily Logs



The RMCC keeps a record of anti-sweat circuit operation and displays the daily statistics in the Daily Logs screen. Each record shows the average ON time percentage and the highest and lowest dewpoints for each day.

Pressing the DOWN arrow key scrolls through the daily logs in reverse chronological order; pressing the UP arrow key scrolls through the daily logs in chronological order.

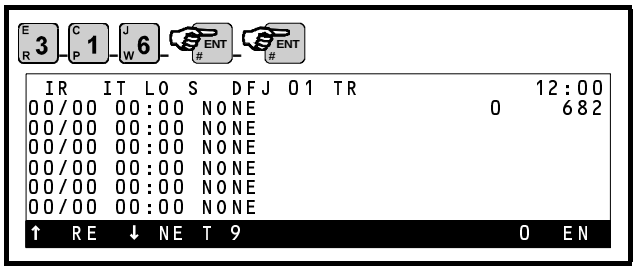
%ON

The average daily ON time percentage for the anti-sweat circuit is shown in the %ON field.

Max/Min (DP)

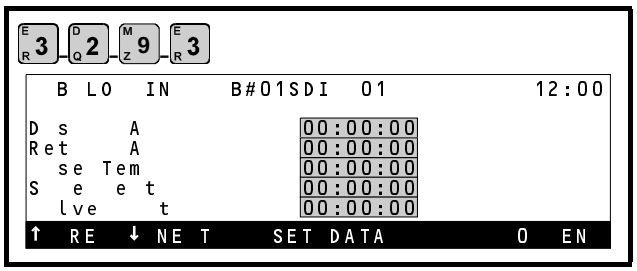
The highest and lowest daily dewpoint values for the anti-sweat circuit is shown in the Max/Min (DP) fields.

12.1.4. Standard Circuit Log/



The RMCC continuously logs circuit information according to circuit input and output logging intervals and stores the information in the Standard Circuit Log. This log and all options for generating graphs from the logged information is displayed at the Logs/Graphs screen. When [9]-Graph is selected, the logging information is displayed in graphical form. For information on navigating through and using the graph screens in the RMCC, see Section 12.2. Graphs.

12.1.5. CCB Log Interval



The RMCC periodically records sensor readings and stores the information in the CCB Logs for each sensor. The Logging Interval defines how often the data for each sensor are recorded. The interval range is between 0 and 99:99:99 and is entered at the CCB Logging Times screen. There is a limited amount of memory for logging; therefore, the smaller the logging interval, the faster the logs will be overwritten. The percentage of log space used within the system is displayed on the Logging Setup screen (see **Section 11.8.9.,** *Logging Setup*).

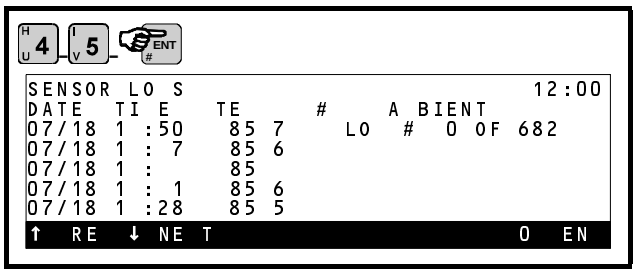
Information received from sensors with a logging interval of zero will not be recorded to the log.

A typical logging interval may be defined for all sensors by using the copy feature described in **Section 11.4.54.,** *Utilities*.

Setup for Additional Logging Intervals

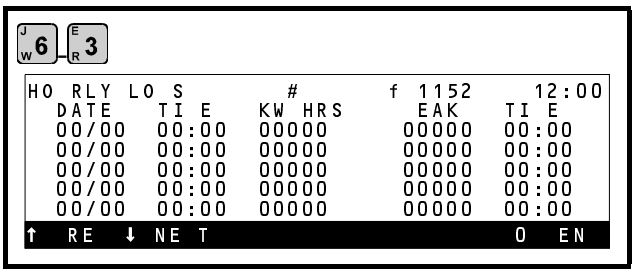
There are two additional screens where other logging intervals for such values as refrigerant leak concentration, coil in temperature, and coil out temperature may be defined. To access these screens, press the DOWN arrow key.

12.1.6. Sensor Logs



Sensor readings are logged to the Sensor Control Log. This historical data is recorded for any of the 48 defined sensors according to user-selected time intervals. Logging Intervals are defined at the Sensor Setup screen (see **Section 11.5.1.,** *Setup*). The RMCC will store as many readings as is specified in Logging Setup on **Section 11.8.9.,** *Logging Setup* for each sensor.

12.1.7. Hourly Demand Log



The Hourly Demand Log displays a summary of the kW usage during the past hour. The date and time of each log are also displayed.

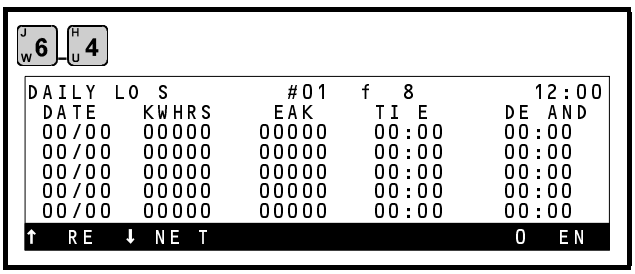
KW HRS

The total kW hours used within the selected hour is displayed in the KW HRS field.

Peak/Time

The peak power is the highest value of kW measured by a kW or watt-hour transducer during the selected hour. The kW peak is displayed in the Peak field and the time of the occurrence is displayed in the Time field.

12.1.8. Daily Demand Log



The Daily Demand Log displays a summary of the kW usage during the previous 24 hour periods. KW usage for up to 48 days may be logged in the Daily Demand Log. The date and total kW hours used in the window during the 24 hour period are listed.

Peak

The peak power is the highest value of kW measured by the kW transducer during a specified period of time.

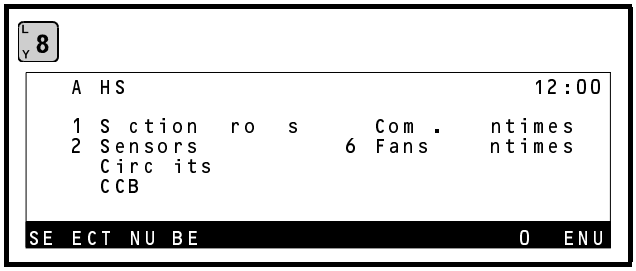
Time

The time of the occurrence of the peak power is displayed in the Time field.

Demand

The Demand field displays the cumulative number of hours the RMCC was in demand during the specified 24 hours.

12.2. Graphs

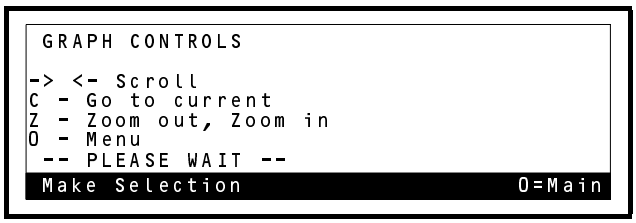


Users may view RMCC log data in graphical format from the Graphs screens. The Graphs menu characterizes all system logs in six different categories:

- *Suction Groups* - all logs related to pressure control, including suction and discharge and compressor operation, but excluding compressor and fan runtimes (see below).
- *Sensors* - the input values for sensors #1-48.
- *Circuits* - all logs for refrigeration circuits #1-48.
- *CCB* - all logs for case control boards.
- *Comp. Runtimes* - bar graph of runtimes for all defined compressors.
- *Fans Runtimes* - bar graph of runtimes for all defined condenser fans.

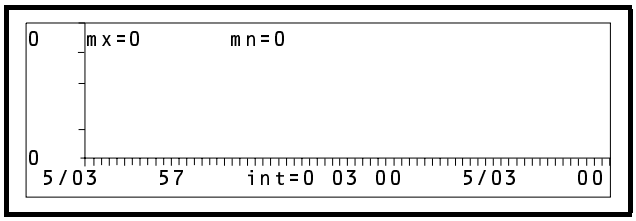
Once a category has been selected, the user must also specify an instance for graphing within the category. Select a category from the menu and then select the instance from the list.

12.2.1. Graph Control Screen



The Control Screen is displayed while a graph is compiling. The screen displays the controls for viewing a graph such as scrolling, zooming, and exiting to the main menu.

12.2.2. Graph View

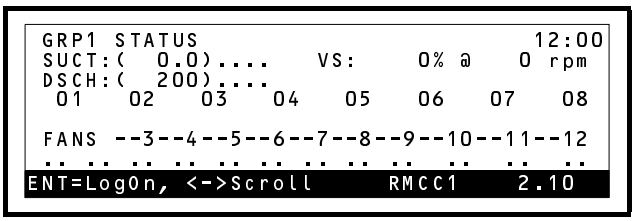


The View Graph screen displays the requested compiled graph. Viewing controls such as scrolling, zooming, and exiting to the main menu are active in this screen.

13 Status Screens

Status screens display current information about the RMCC and Case Control system. Users may view information such as the status of alarms, inputs/outputs, and board communication.

13.1. Main Status Screen

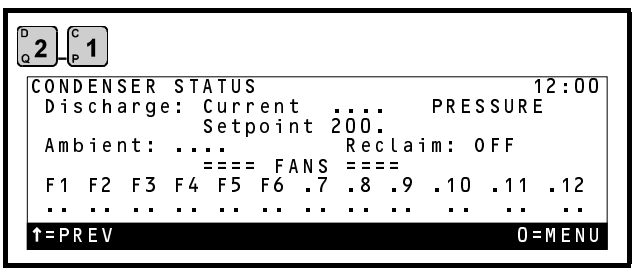


The Main Status screen may be accessed without logging into the system. After the unit is turned on, the unit goes through a software check, then the main status screen is displayed. From this screen, the arrow keys allow users to scroll through additional RMCC status screens to view current information about specific components within the RMCC. Status screens available before logon include the following:

- Suction Group Status (**Section 13.9.2.,** *Suction Group Status*)
- Condenser Status (**Section 13.1.1.,** *Condenser Status*)
- Sensor Status (**Section 13.5.1.,** *Sensor Status*)
- Circuits Status (**Section 13.3.1.,** *Circuit Status*, or **Section 13.4.1.,** *Case Control Circuit Status*)

A complete explanation of what information is available at each status screen is available in the applicable section.

13.1.1. Condenser Status


D Q 2
C P 1
CONDENSER STATUS 12:00
Discharge: Current .... PRESSURE
Setpoint 200.
Ambient: .... Reclaim: OFF
==== FANS ====
F1 F2 F3 F4 F5 F6 .7 .8 .9 .10 .11 .12
↑=PREV 0=MENU

The Condenser Status screen displays the current status of each defined condenser fan. In addition to each condenser fan's ON or OFF status, users may view the current discharge temperature or pressure reading, the current discharge temperature or pressure set point, and the current reclaim status.

Discharge

The Discharge field displays the discharge sensor's current reading, the defined discharge set point, and whether the discharge is being controlled by temperature or pressure. If any of these values are undefined, a line of periods will be shown in the field.

Ambient

The Ambient field displays the current outside temperature reading. If the RMCC receives no reading from an outside temperature sensor, a line of periods will be shown in the field.

Reclaim

The Reclaim field shows the reclaim status. If a reclaim is being called for, the Reclaim field will read ON; otherwise, it will read OFF.

Fans

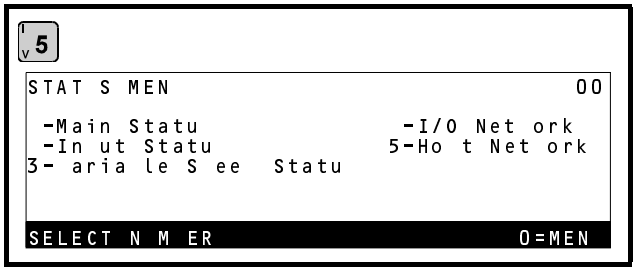
The bottom two lines of the Condenser Status screen show the status of the condenser fans. If a fan has been given a board and point address on the Output Definitions screen, an "F" will appear by the fan's corresponding number. Otherwise, a period will appear by the fan number. Note in the sample screen shown above that fans 1 - 6 are defined "F1 - F6" and fans 7 - 12 are not ".7 - .12".

The fields directly below the fan numbers display the current state of the fans. A fan will be shown as either on "ON" or off "..". If a fan is on or off because of a user-ordered bypass, an asterisk will appear next to the fan's status ("*ON" for bypassed on, "*.." for bypassed off).

Phase Loss

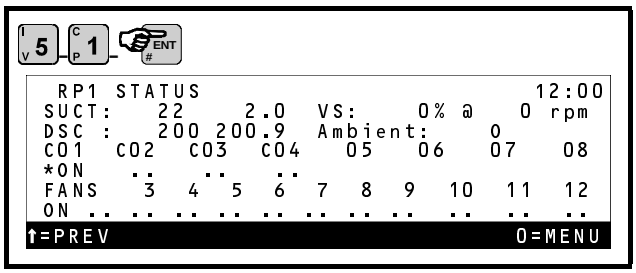
When a phase loss occurs, all of the condenser fans are bypassed off. The Condenser Status screen will display "PHASE LOSS" on occurrence so that the user can verify that the condenser fans are bypassed off due to the phase loss and not another condition.

13.2. Status Menu



Item	Description	Page
1	Main Status	13-2
2	Input Status	13-3
3	Variable Speed Status	13-3
4	I/O Network	13-3
5	Host Network	13-3

13.2.1. Main Status



The Main Status screen displays the current status within each defined RMCC suction group. In addition to the status of each compressor within the suction group, users may view the current suction and discharge pressure or temperature set points and status, the current variable speed compressor percentage and rpm value, and the status of all fans within the group.

Suct

The current suction pressure set point is shown in parenthesis in the Suct field. Beside this value, the current suction pressure is shown.

VS

If a variable speed compressor is present in this suction group, the VS field will show the percentage and the RPMs at which the compressor is operating.

Dsch

The current discharge temperature or pressure set point is shown in parenthesis in the Dsch field. Beside this value, the current discharge temperature or pressure is shown.

Ambient

The Ambient field displays the current ambient temperature. If an ambient temperature sensor is not defined, this field is not displayed.

Compressors

The numbers 01 to 08 in the fourth row of the display represent each compressor in the suction group. If the compressor has been previously defined in the system software (see **Section 11.2.7.,** *Group 1 Setup*), a letter will appear before the compressor's number signifying whether it is a compressor ("C"), a variable-speed compressor ("V"), or an unloader ("U"). If more than eight compressors are defined the line displaying the condenser fan status is replaced an additional compressor status line. Condenser fan status must then be viewed at the condenser status screen.

The operating status of each defined compressor is shown directly below the appropriate number. Four different operating states may be displayed in these fields:

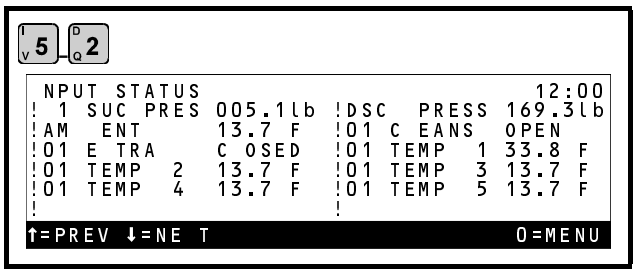
- *ON* - The compressor is currently on.
- .. - The compressor is currently off.
- **ON* - The compressor is on because of a manual bypass.
- *.. - The compressor is off because of a manual bypass.

Fans

The bottom two lines of the display show the operating status of the condenser fans. When a fan is has been configured in the output definitions screens, an "F" appears next to the fan number on the RMCC Group Status screen. Either of four operating states may be displayed below the fan numbers:

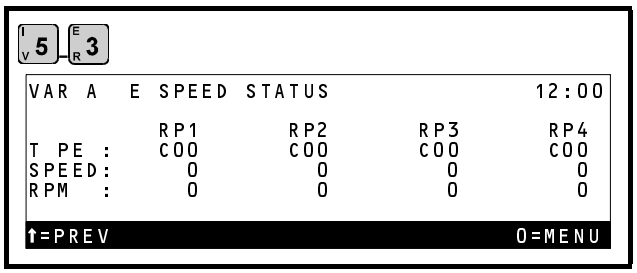
- *ON* - The fan is currently on.
- .. - The fan is currently off.
- **ON* - The fan is on because of a manual bypass.
- *.. - The fan is off because of a manual bypass.

13.2.2. Input Status


I V 5
D Q 2
NPUT STATUS 12:00
! 1 SUC PRES 005.1lb !DSC PRESS 169.3lb
!AM ENT 13.7 F !01 C EANS OPEN
!01 E TRA C OSED !01 TEMP 1 33.8 F
!01 TEMP 2 13.7 F !01 TEMP 3 13.7 F
!01 TEMP 4 13.7 F !01 TEMP 5 13.7 F
!
↑=PREV ↓=NE T 0=MENU

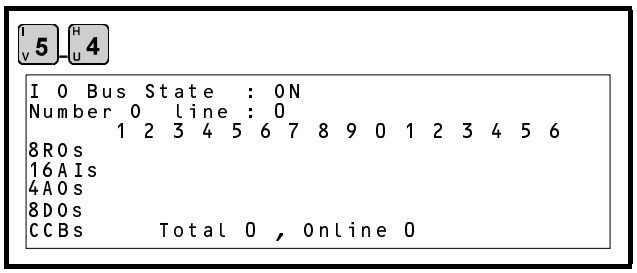
The Input Status screen displays the current status of all inputs connected to the 16AI or 8IO board and programmed within the RMCC. Each status display is based on the sensor type. For linear sensors, the status screen displays the actual or raw value of the sensor in millivolts regardless of any offsets that may be in place.

13.2.3. Variable Speed Status



The status of all variable speed compressors defined within the RMCC are displayed at the Variable Speed Status screen. The first compressor within each suction group may be defined as a variable speed compressor. If the displayed suction group contains a variable speed compressor, the variable speed percentage and the current rpm reading is displayed for that compressor in the Speed and RPM fields respectively.

13.2.4. I/O Network Status (I/O Board Status)



The I/O Network Status screen displays the status of the I/O Network. No modifications to the network may be made at this screen.

I/O Bus State

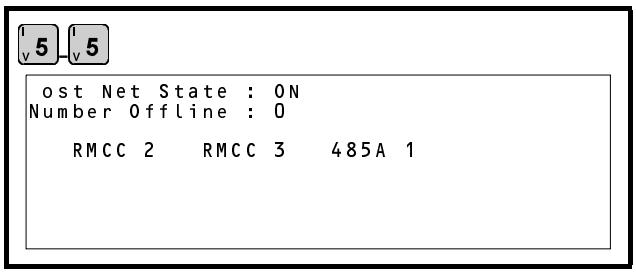
The status of the I/O Network is displayed in the I/O Bus State field. This field reflects if the network is ON or OFF. Modifications to this status may be made at the Reset screen (see **Section 11.8.22.,** *Reset*).

Number Offline

The status of all boards connected to the I/O Network are displayed in the Number Off-line field. A"1" under the specified board indicates the board is on-line. A period "." under the specified board indicates the board is off-line. A space under the specified board indicates the board is not defined within the system. The RMCC calculates the number of defined boards currently off-line and displays this calculation in the Number Off-line field.

The I/O Network Status screen displays the total number of CCBs connected to the network, and the number of these boards that are on-line. Refer to Board Circuit Assignment on **Section 11.4.52.,** *Board to Circuit Assignment* for detailed network status information.

13.2.5. Host Network Status



The Host Network Status screen displays the status of the Host Network. No modifications to the network may be made from this screen.

Host Net State

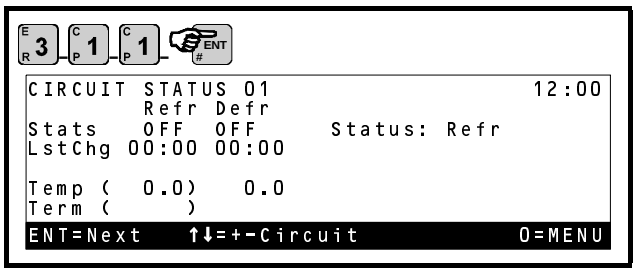
The Host Network Status screen will not display the status of the controller currently being used.

The status of the host network is displayed in the Host Net State field. If the network is defined properly on each controller, this field should read OK. If the network is improperly configured, this field will read Reconfigure. Finally, if the network is reset OFF, the field will read OFF.

If the field reads Reconfigure, there is a problem with the configuration of the hardware. For more information about hardware configuration, see **Section 5,** *Hardware Overview*.

13.3. Circuits

13.3.1. Circuit Status


ER 3 CP 1 CP 1 ENT #
CIRCUIT STATUS 01 12:00
Refr Defr
Stats OFF OFF Status: Refr
LstChg 00:00 00:00
Temp (0.0) 0.0
Term ( )
ENT=Next ↑↓=+-Circuit 0=MENU

The first Circuit Status Screen displays the circuit, circuit status, sensor input information, and output status information.

Stats

The current Refrigeration and Defrost Output status information is displayed in the Stats fields. These fields will display either OFF or ON. Also displayed is the circuit status, which will display Refr during refrigeration mode, Defr during defrost mode, Ovrd during manual override mode, or Drip if the RMCC is in the drain time period immediately after defrost termination.

LstChg

The times, in 24-hour format, that the refrigeration or defrost outputs were last activated are displayed in the LstChg field under the Refr and Defr columns.

Temp

The current Control Temperature set point is shown in parenthesis in the Temp field. Beside this number is the current circuit temperature reading.

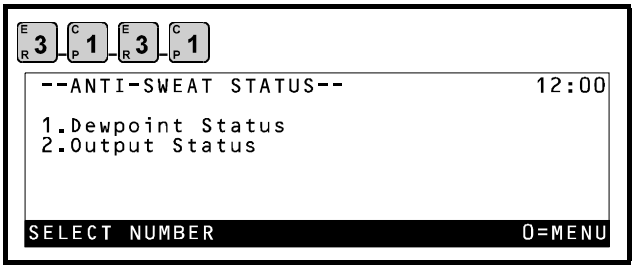
Term

The current Termination Temperature set point is shown in parenthesis in the Term field. Beside this number is the current termination sensor reading. If the termination sensors are digital, no value will appear in parenthesis, and the termination sensor reading will display either a "+" for CLOSED or a "-" for OPEN. If no termination strategy is defined for this circuit, NONE will appear in the Termination Temperature field.

13.3.2. Standard Circuit Summary

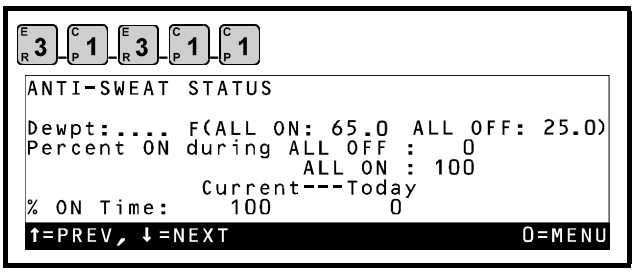
Circuit summaries are also accessible from the main Circuit Control menu. For a description of these screens, see **Section 13.2.4.,** *I/O Network Status (I/O Board Status)*.

13.3.3. Anti-Sweat Status Menu.



Item	Description	Page
1	Dewpoint Status	14-4
2	Output Status	14-5

13.3.4. Anti-Sweat Dewpoint Status Screen


ER 3 CP 1 ER 3 CP 1 CP 1
ANTI-SWEAT STATUS
Dewpt:.... F(ALL ON: 65.0 ALL OFF: 25.0)
Percent ON during ALL OFF : 0
ALL ON : 100
Current---Today
% ON Time: 100 0
↑=PREV, ↓=NEXT 0=MENU

Dewpoint

The current dewpoint sensor reading or calculation is shown in the Dewpoint field. To the right of this value, the All On and All Off set points, specified in **Section 11.4.10.,** *Anti-Sweat Circuit Setpoints*, are displayed.

Percent ON during All OFF/All ON

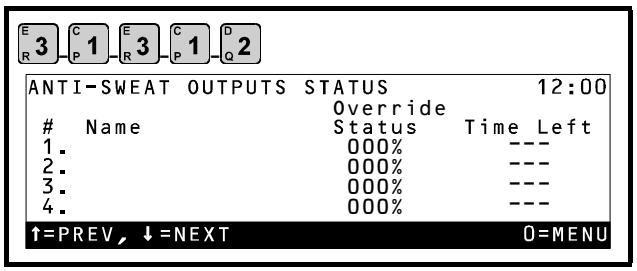
The Percent ON During ALL OFF and Percent ON During ALL ON set points, specified in **Section 11.4.10.,** *Anti-Sweat Circuit Setpoints*, are displayed in these two fields.

%On Time

The current ON percentage at which the selected circuit's anti-sweat heaters are operating is displayed in the Current field. The average ON time percentage for the anti-

sweat circuit during the entire day is displayed in the Today field.

13.3.5. Anti-Sweat Output Status



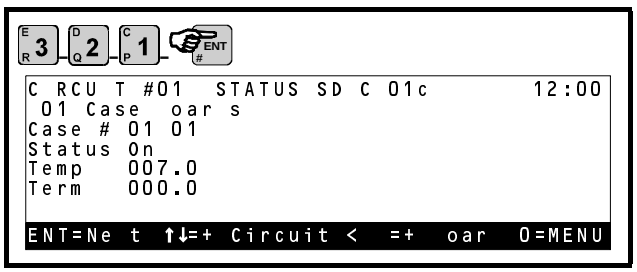
The real-time status of anti-sweat heater operation is shown in the Anti-Sweat Output Status Screen. Anti-sweat heaters operate by measuring dewpoint, comparing the dewpoint value to the anti-sweat set points, and pulsing the heaters on and off for a percentage of the on/off interval, defined in **Section 11.4.9.,** *Anti-Sweat Outputs Setup*. The fields in the Anti-Sweat Status Screen show the current status of the pulse (either ON or OFF) and the time remaining before the next status switch.

For example, if a heater is operating at 50% during an interval of four seconds, the Status field for that heater will show ON for two seconds and OFF for two seconds. Every time the Status field changes, the Time Left field will reset to two seconds and count down to zero.

If a heater is being overridden ON or OFF by a manual or external bypass, an asterisk will appear to the right of the Status field. The Time Left field will display “BPSS” for manual bypasses and the time left in minutes for external bypasses.

13.4. Case Control Status

13.4.1. Case Control Circuit Status



The first Case Controlled Circuit Status screen displays the current number of CCBs within the circuit, the selected case number, the current case status, the current case temperature, and the last recorded termination temperature.

Case Boards

The number of CCBs within the selected circuit is displayed in the Case Boards field.

Case

The assigned case number of the selected case is displayed in the Case # field. The number lists first the circuit number followed by the case number.

Status

The status of the selected board is displayed in the Status field. One of the following conditions will be displayed:

- *On* - the selected board is calling for a stage of refrigeration.
- *Off* - the selected board is not calling for a stage of refrigeration.
- *Def* - the selected board is calling for a stage of defrost.
- *Lost* - the selected board cannot be found within the defined circuit.

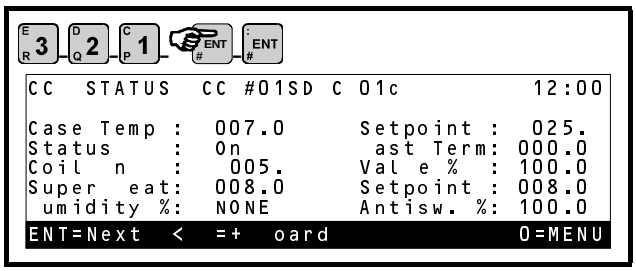
Temp

The current case temperature is displayed in the Temp field. This temperature is calculated according to the Temperature Control Strategy defined at the Circuit Setup 2 screen (see **Section 11.4.45.,** *Circuit Setup 2 (Add/Edit Circuit)*).

Term

The current Termination Temperature sensor reading is displayed in the Term field.

13.4.2. CCB Status 1 (Liquid Pulse and Stepper Only)


CC STATUS CC #01SD C 01c 12:00
Case Temp : 007.0 Setpoint : 025.
Status : On ast Term: 000.0
Coil n : 005. Val e % : 100.0
Super eat: 008.0 Setpoint : 008.0
umidity %: NONE Antisw. %: 100.0
ENT=Next < =+ oard 0=MENU

For liquid pulse and liquid stepper CCBs, this status screen displays current information about case sensor readings and set points.

Case Temp

The current temperature in the selected case is displayed in the Case Temp field. This temperature is calculated according to the Temperature Control Strategy defined at the Circuit Setup 2 screen (see **Section 11.4.45.,** *Circuit Setup 2 (Add/Edit Circuit)*).

Setpoint

The current Control Temperature Set Point is displayed in the Setpoint field. This set point is defined at the Circuit Set Points 1 screen (see **Section 11.4.46.,** *Circuit Set Points 1 (Add/Edit Circuit)*) and is the temperature the RMCC will maintain in the circuit.

Status

The status of the selected CCB is displayed in the Status field. One of the following conditions will be displayed:

- *On* - the selected case board is calling for a stage of refrigeration.
- *Off* - the selected case board is not calling for a stage of refrigeration.
- *Def* - the selected case board is calling for a stage of defrost.
- *Lost* - the selected case board cannot be found within the defined circuit.

Last Term

The temperature at which defrost was last terminated within the selected case is displayed in the Term field.

Coil In

The current Coil-In Temperature of the selected case is displayed in the Coil In field.

Valve %

When operating an Electronic Expansion Valve (EEV), the current valve percentage is displayed in the Valve % field.

Super Heat

The current superheat calculation for the selected case is displayed in the Super Heat field. The term “superheat” is referring to the temperature differential across the evaporator coil (coil outlet - coil inlet).

Setpoint

The current Superheat Set Point defined for the selected case is displayed in the Setpoint field. This set point is defined at the CCB Setpoints screen (see **Section 11.4.29.,** *CCB Set Point Screen 1 (Liquid Pulse and Stepper Only)*). The Superheat Set Point is the superheat value the RMCC will maintain within the selected case.

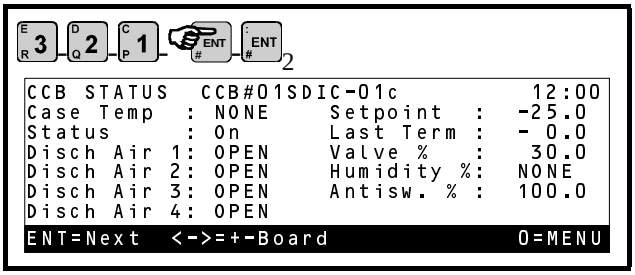
Humidity %

When the CCB’s Anti-Sweat feature is active, the current status of the selected humidity sensor is displayed in the Humidity % field.

Antisw.%

The Anti-Sweat percentage is displayed in the Antisw. % field. This percentage is the cycle rate of voltage pulsing to the case’s anti-sweat heaters.

13.4.3. CCB Status 1 (Suction Stepper Only)


E 3 R
D 2 Q
C 1 P
ENT #
ENT #
2
CCB STATUS CCB#01SDIC-01c 12:00
Case Temp : NONE Setpoint : -25.0
Status : On Last Term : - 0.0
Disch Air 1: OPEN Valve % : 30.0
Disch Air 2: OPEN Humidity %: NONE
Disch Air 3: OPEN Antisw. % : 100.0
Disch Air 4: OPEN
ENT=Next <->=+-Board 0=MENU

For suction stepper circuits, this status screen displays current information about case sensor readings and set points.

Case Temp

The current case temperature sensor reading is displayed in the Case Temp field.

Setpoint

The defined case temperature set point is displayed in the Setpoint field.

Status

The status of the selected CCB is displayed in the Status field. One of the following conditions will be displayed:

- *On* - the selected case board is calling for a stage of refrigeration.
- *Off* - the selected case board is not calling for a stage of refrigeration.
- *Def* - the selected case board is calling for a stage of defrost.
- *Lost* - the selected case board cannot be found within the defined circuit.

Last Term

The temperature at which defrost was last terminated within the selected case is displayed in the Term field.

Disch Air

The current temperature readings of discharge sensors one through four are shown in the Disch Air 1 - Disch Air 4 fields.

Valve %

When operating an Electronic Expansion Valve (EEV), the current valve percentage is displayed in the Valve % field.

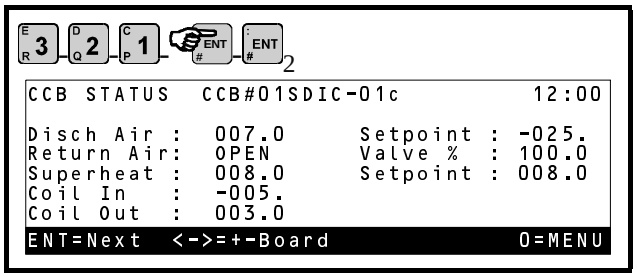
Humidity %

When the CCB's Anti-Sweat feature is active, the current status of the selected humidity probe is displayed in the Humidity % field.

Antisw.%

The Anti-Sweat percentage is displayed in the Antisw. % field. This percentage is the cycle rate of voltage pulsing to the case's anti-sweat heaters.

13.4.4. CCB Status 2 (Liquid Pulse and Stepper Only)


3
2
CCB STATUS CCB#01SDIC-01c 12:00
Disch Air : 007.0 Setpoint : -025.
Return Air: OPEN Valve % : 100.0
Superheat : 008.0 Setpoint : 008.0
Coil In : -005.
Coil Out : 003.0
ENT=Next <->=+-Board 0=MENU

For liquid pulse and liquid stepper circuits, this status screen displays the current sensor readings and set points of the values important to controlling the EEV.

Disch Air

The current Discharge Air Temperature within the selected case is displayed in the Disch Air field.

Setpoint

The current Discharge Air Temperature Set Point defined for the selected case is displayed in the Setpoint field.

Return Air

The current Return Air Temperature within the selected case is displayed in the Return Air field.

Valve %

When operating an Electronic Expansion Valve (EEV), the current valve percentage is displayed in the Valve % field. A case may be controlled with up to two expansion valves. Status information about the second valve is displayed at the CCB Status 3 screen.

Super Heat

The current superheat calculation for the selected case is displayed in the Super Heat field. The term "superheat" refers to the temperature differential across the evaporator coil (coil outlet - coil inlet).

Setpoint

The current Superheat Set Point defined for the selected case is displayed in the Setpoint field. This set point is defined at the CCB Setpoints screen (see **Section 11.4.49.,** *Circuit Set Points 4 (Add/Edit Circuit)*). The Superheat Set Point is the superheat value the RMCC will maintain within the selected case.

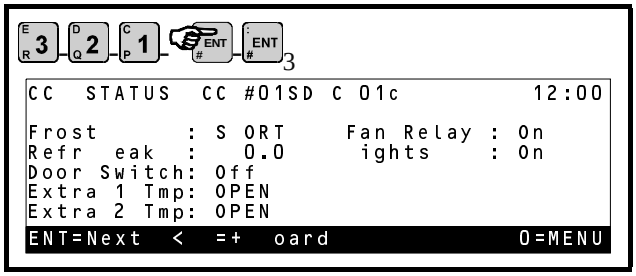
Coil In

The current Coil-In Temperature within the selected case is displayed in the Coil In field.

Coil Out

The current Coil-Out temperature within the selected case is displayed in the Coil Out field.

13.4.5. CCB Status 2 (Suction Stepper Only)


3
CC STATUS CC #01SD C 01c 12:00
Frost : S ORT Fan Relay : On
Refr eak : 0.0 ights : On
Door Switch: Off
Extra 1 Tmp: OPEN
Extra 2 Tmp: OPEN
ENT=Next < =+ oard 0=MENU

For suction stepper CCBs, this status screen displays the current status of the demand defrost sensor(s), refrigerant leak sensor, door switch, extra temperature sensors, fan relay, and case lights.

Frost

When the Demand Defrost feature is activated at the Circuit Set Points 3 screen (see **Section 11.4.48.,** *Circuit Set Points 3 (Add/Edit Circuit)*), the current status of the Demand Defrost Sensor is displayed in the Frost field.

Refr Leak

The current reading from the refrigerant leak sensor is displayed in the Refr Leak field. This sensor calculates the parts per million rating of escaped refrigerant.

Door Switch

When a Door Switch is configured at the Circuit Setpoints 4 screen (see **Section 11.4.49.,** *Circuit Set Points 4 (Add/Edit Circuit)*), the current status of the Door Switch is displayed in the Door Switch field.

Extra Temp

The current temperature readings of the Extra 1 Tmp and Extra 2 Temp sensors are displayed in the Extra 1 Temp and Extra 2 Temp fields. The extra temp sensors may be used to monitor temperature only.

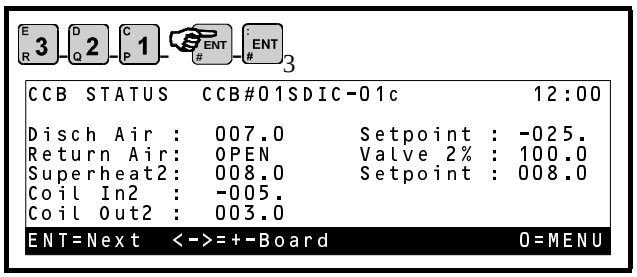
Fan Relay

The current status of the Fan Relay is displayed in the Fan Relay field.

Lights

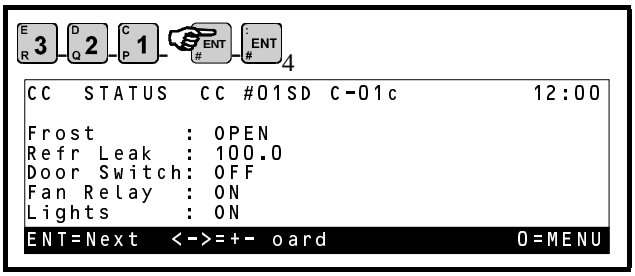
The current status of the case lights is displayed in the Lights field.

13.4.6. CCB Status 3 (Liquid Pulse Only)



A Liquid Pulse CCB may control up to two liquid pulse valves; if a second pulse valve is connected to the CCB, status information about the second EEV may be viewed in Status Screen 3. To access this screen from Status Screen 2, press ENTER.

13.4.7. CCB Status 4 (Liquid Pulse and Stepper Only)



For liquid pulse and liquid stepper CCBs, this status screen displays the current operating status of the demand defrost sensor(s), refrigerant leak sensor, door switch, fan relay, and case lights.

Frost

When the Demand Defrost feature is activated at the Circuit Set Points 3 screen (see **Section 11.4.48.,** *Circuit Set Points 3 (Add/Edit Circuit)*), the current status of the Demand Defrost Sensor is displayed in the Frost field.

Refr Leak

The current reading from the refrigerant leak sensor is displayed in the Refr Leak field. This sensor calculates the parts per million rating of escaped refrigerant.

Door Switch

When a Door Switch is configured at the Circuit Set-points 4 screen (see **Section 11.4.49.,** *Circuit Set Points 4 (Add/Edit Circuit)*), the current status of the Door Switch is displayed in the Door Switch field.

Fan Relay

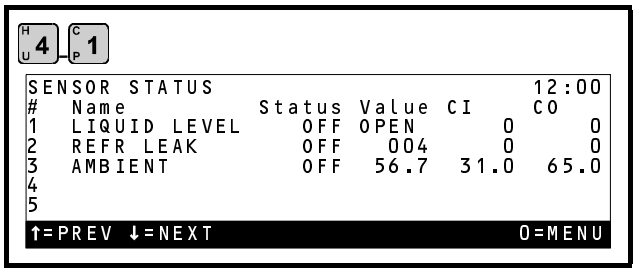
The current status of the Fan Relay is displayed in the Fan Relay field.

Lights

The current status of the case lights is displayed in the Lights field.

13.5. Sensors

13.5.1. Sensor Status


H U 4
C P 1
SENSOR STATUS 12:00
Name Status Value CI CO
1 LIQUID LEVEL OFF OPEN 0 0
2 REFR LEAK OFF 004 0 0
3 AMBIENT OFF 56.7 31.0 65.0
4
5
↑=PREV ↓=NEXT O=MENU

The Sensor Control Status screen displays the current status information about each defined RMCC sensor. Users may view the sensor name, current controlled output status (if applicable), current sensor reading, and the defined cut-in and cut-out set points if the displayed sensor is controlling an output. No modifications to the sensor controls may be made at these screens. Up to five sensors may be viewed on the screen at one time. Use the up and down arrows to view additional sensors.

#/Name

The # and Name fields display the sensor number and the sensor name.

Status

If the sensor is controlling an output, and if the output board and point location is specified at the Output Definitions screen—see **Section 11.8.2.,** *Output Definitions*—the status of the controlled output (either ON or OFF) will be displayed in the Status field.

Value

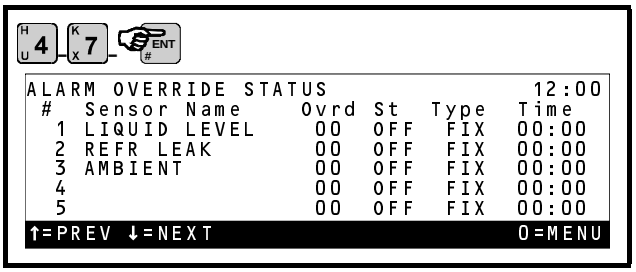
The current sensor reading is shown in the Value field.

CI/CO

The CI and CO fields display the cut-in and cut-out set points respectively. When the sensor value rises above the cut-in value, the sensor's controlled output will activate. When the sensor value falls below the cut-out value, the controlled output will deactivate.

13.6. Alarms

13.6.1. Alarm Override Status


H U 4
K X 7
ENT #
ALARM OVERRIDE STATUS 12:00
Sensor Name Ovrd St Type Time
1 LIQUID LEVEL 00 OFF FIX 00:00
2 REFR LEAK 00 OFF FIX 00:00
3 AMBIENT 00 OFF FIX 00:00
4 00 OFF FIX 00:00
5 00 OFF FIX 00:00
↑=PREV ↓=NEXT 0=MENU

The status of all defined Sensor Alarm Overrides are displayed at the Alarm Override Status screen. Alarm Override Inputs are defined at the Input Definitions screens (see **Section 11.8.1.,** *Input Definitions*) and are assigned to a sensor at the Alarm Overrides screen (see **Section 14.5.,** *Alarm Overrides*). Users may view the Sensor Name that contains the displayed override, the associated Alarm Override Input assigned to the sensor, the status of the override, the type of override defined to the displayed sensor, and if currently in override mode, the time remaining in the override duration.

#/Name

The # and Name fields display the sensor number and the sensor name respectively.

Ovrd

The Ovrd field displays the number of the alarm override input assigned to each sensor.

St

The St field displays the operational status (either ON or OFF) of the alarm override for each sensor.

Type

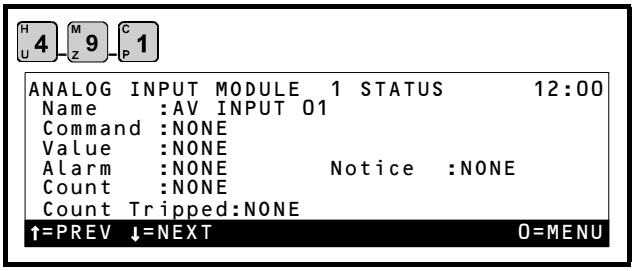
The Type field shows whether the alarm override is fixed or timed for each sensor.

Time

For timed overrides, the amount of time remaining in the override duration is shown in the Time field.

13.7. Input/Output Modules

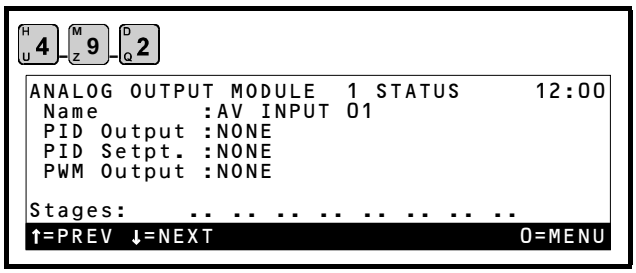
13.7.1. Analog Input Module Status



Users may view the real-time status of an Analog Input Module's outputs in the Analog Input Module Status screen. The Value and Count outputs will appear as analog values, while the Command, Alarm, Notice, and Count Tripped inputs will appear as either OFF, ON, or NONE.

To view the status of other Analog Input Modules, press the UP and DOWN arrow keys.

13.7.2. Analog Output Module Status

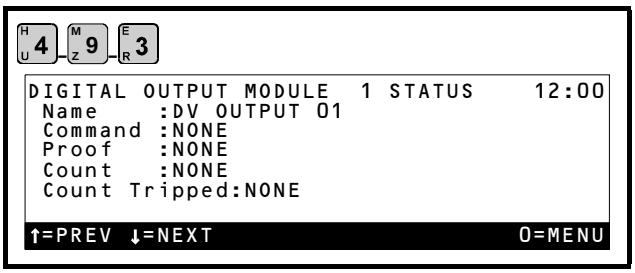

H U 4
M Z 9
D Q 2
ANALOG OUTPUT MODULE 1 STATUS 12:00
Name :AV INPUT 01
PID Output :NONE
PID Setpt. :NONE
PWM Output :NONE
Stages: .. ..
↑=PREV ↓=NEXT 0=MENU

Users may view the real-time status of an Analog Output Module's outputs in the Analog Output Module Status screen. The PID Output will appear as a value between 0% and 100%, the PID Setpoint will appear as an analog value, and the PWM Output will appear as either ON, OFF, or NONE, depending upon the current state.

The Stages fields at the bottom of the screen show the status of Stage 1 through Stage 8 of the Analog Output Module's Sequencer outputs (see "Sequencer" on Section Sequencer). Each field will read either ".." for OFF or "ON" for ON. If a field is blinking, the stage is currently in the interstage delay period between transition changes (see "Sequencer" on Section Sequencer).

To view the status of other Analog Output Module Status screens, press the UP and DOWN arrow keys.

13.7.3. Digital Output Module Status

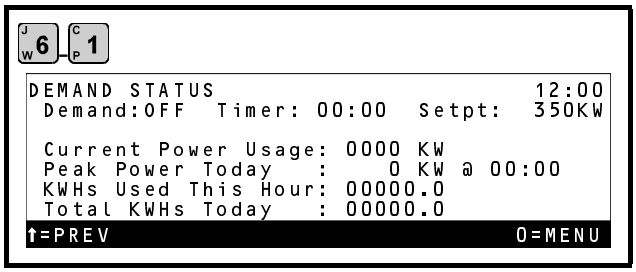


Users may view the real-time status of a Digital Output Module's outputs in the Digital Output Module Status screen. The Command, Proof, and Count Tripped output values will appear as either ON, OFF, or NONE. The Count value will appear as an analog value.

To view the status of other Digital Output Module Status screens, press the UP and DOWN arrow keys.

13.8. Demand

13.8.1. Demand Status


DEMAND STATUS 12:00
Demand:OFF Timer: 00:00 Setpt: 350KW
Current Power Usage: 0000 KW
Peak Power Today : 0 KW @ 00:00
KWHs Used This Hour: 00000.0
Total KWHs Today : 00000.0
↑=PREV 0=MENU

The RMCC activates a demand relay when the energy being used by the system exceeds the demand limit set point. When this set point is exceeded, the RMCC is said to be in Demand.

The Demand Status screen displays the current status of demand control within the RMCC. Information displayed on this screen includes the ON/OFF status of demand, a summation of the times the RMCC has been in demand, the demand limit set point, current power usage, peak power usage, power used in the past hour, and total power used for the day.

Demand

The Demand field will read ON when the energy being used exceeds the Demand Set Point defined on **Section 11.7.1.,** *Demand Set Points.* Otherwise, the Demand field will read OFF.

Timer

A timer within the RMCC calculates the number of hours and minutes the current power usage has exceeded the defined Demand Set Point during the last 24-hour time period. The timer resets every night at midnight and the cumulative demand time is cleared.

Set Point

The defined Demand Set Point is displayed in the Set Point field. This is the desired level of energy consumption within the system.

Current Power Usage

The current kW reading provided by the kW transducer or watt-hour transducer is displayed in the Current Power Usage field.

Peak Power Today

The peak power is the highest value of kW measured by the kW or watt-hour transducer during a specified period of time. The peak power for the day is displayed in the Peak Power Today field along with the time of its occurrence. This measurement may help determine the time of day to minimize active loads to help reduce power consumption.

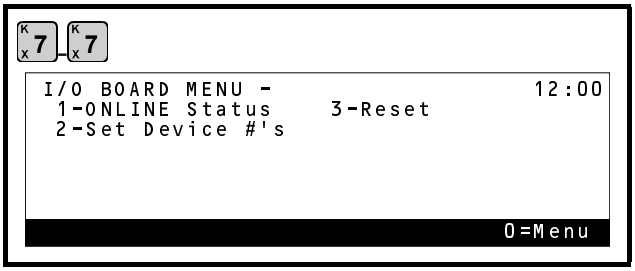
KWHs Used This Hour

The kW measurement for the previous hour is displayed in the KWHs Used This Hour field.

Total KWHs Today

The total kW usage for the day is displayed in the Total KWHs Today field.

13.9. I/O Boards

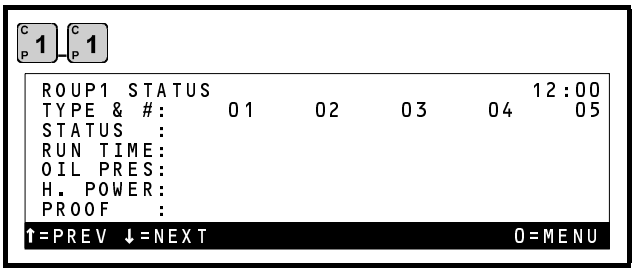


Item	Description	Page
1	On-Line Status	13-11

13.9.1. On-Line Status

Refer to the description of the I/O Bus State in **Section 13.2.4.,** *I/O Network Status (I/O Board Status)*.

13.9.2. Suction Group Status



The Pressure Status screens display the current status of each compressor defined using the Output Definitions screens (**Section 11.8.2.,** *Output Definitions*). The compressors are grouped and displayed according to how many compressors have been defined for Groups One through Four at the Pressure Groups Setup screen (**Section 11.2.8.,** *Pressure Setup*). If more than five compressors are defined for a group, pressing the down arrow will display the additional compressors.

Type &

The Type & # field shows the compressor type: (C)ompressor, (V)ariable speed compressor, or (U)nloader. These types are defined at the Group 1-4 Setup screens (**Section 11.2.7.,** *Group 1 Setup*). The compressor number is shown as defined under Output Definitions.

Status

The current operational status of the each compressor is given as "." off, or "ON" on.

Run Time

The accumulated run time hours of each compressor are shown in the Run Time field. This value may be cleared at the Group 1-4 Setup screens.

Oil Pres

The net oil pressure (oil pressure reading - suction pressure reading) is displayed in the Oil Pres field.

H. Power

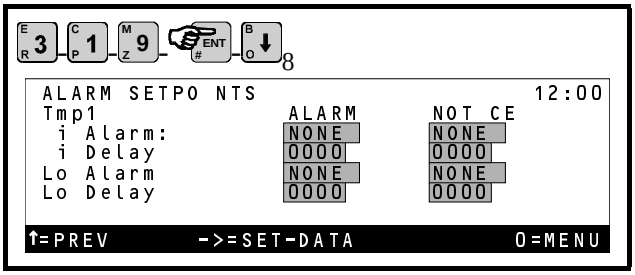
The horsepower rating of each compressor is displayed as defined at the Group 1-4 Setup screens.

Proof

If a proof input is defined under Input Definitions (**Section 11.8.1.,** *Input Definitions*) the Proof field will display "OK". If the compressor proof contact remains open for an amount of time equal to the Proof Delay (defined in **Section 11.2.3.,** *Group 1 Pressure Alarms Setup*), the field will read "FAIL".

14 Alarms

14.1. Alarm Set Points


3 1 9 ENT 8
ALARM SETPO NTS 12:00
Tmp1 ALARM NOT CE
i Alarm: NONE NONE
i Delay 0000 0000
Lo Alarm NONE NONE
Lo Delay 0000 0000
↑=PREV ->=SET-DATA 0=MENU

Alarms/Notices [-99 - 100, (N)one] [N]

Delays [0 - 999] [0]

Alarm Control within the RMCC includes the generation of alarms or notices when specific control values exceed HI and LO alarm set points. When the current input sensor reading exceeds the user-defined HI and LO alarm set points, an alarm or notice will be generated. A notice is a low-level warning that creates an entry in the RMCC Alarm Log and initiates no other signal. An alarm is a high-level warning that will appear in the RMCC Alarm Log and may be accompanied by a contact closure for on-site operation of a bell, light, horn, etc. An alarm may also initiate an alarm dialout sequence and/or the activation of the 485 Alarm Panel.

Sensor alarm set points are defined at the Alarm Setpoints screen. This screen will display only those sensors defined at the Circuit Setup screens. Alarm delays are also defined at this screen. When the RMCC generates an alarm or a notice, it must wait the specified time delay before activating the alarm sequence.

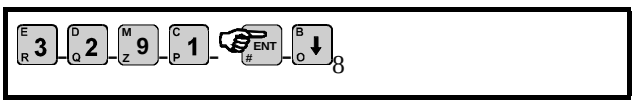
Pressing the down arrow key will allow users to specify alarm and notice set points for other sensors.

14.2. Case Control Alarm Set Points

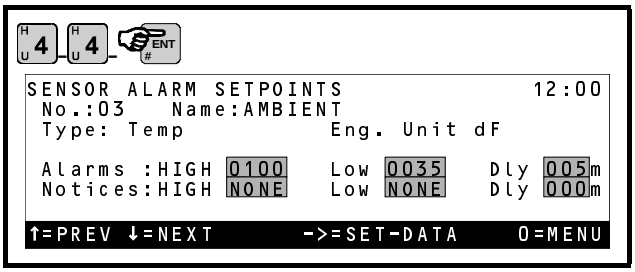
Refer to the description of Alarm Set Points in **Section 14.1.,** *Alarm Set Points*.

14.3. Case Control Alarm Set Points (Add/Edit Circuit)

Refer to the description of Alarm Set Points on Section 14.1. Alarm Set Points.



14.4. Sensor Alarm Setpoints


4 4 ENT
SENSOR ALARM SETPOINTS 12:00
No.:03 Name:AMBIENT
Type: Temp Eng. Unit dF
Alarms :HIGH 0100 Low 0035 Dly 005m
Notices:HIGH NONE Low NONE Dly 000m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

Alarm Control within the RMCC includes the generation of alarms or notices when specific control values exceed HI and LO alarm set points. When the current sensor reading exceeds the user-defined HI and LO alarm set points, an alarm or notice will be generated. These Sensor Alarm Set Points are defined at the Sensor Alarm Setpoints screen.

#/Name/Type/Eng. Unit

Selecting the Alarms command activates a sensor selection screen where users select the appropriate sensor number to be defined. The selected sensor number, name,

type, and associated engineering unit are displayed at the Sensor Alarm Setpoints screen in the #, Name, Type, and Eng. Unit fields respectively.

Alarms/Notices [(N)one (O)pen, (C)losed]

When control values are received by the RMCC from the specified sensors, they may be compared to the user-defined High and Low alarm set points to determine if the RMCC should generate an alarm or notice. A notice creates an entry in the RMCC Alarm Log and initiates no other signal. An alarm is a high-level warning that will appear in the RMCC Alarm Log and may be accompanied by a contact closure for on-site operation of a bell, light, horn, etc. An alarm may also initiate an alarm dialout sequence and/or the activation of the 485 Alarm Annunciator Panel.

Time Delays [0 - 240 minutes]

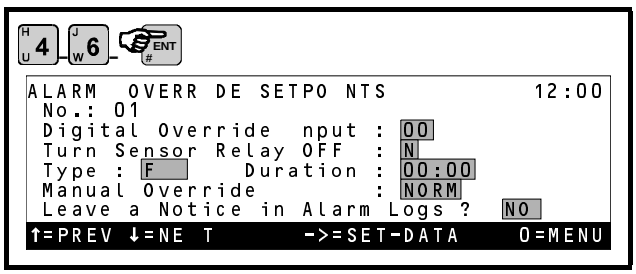
When the RMCC generates an alarm or a notice, it must wait the specified time delay before activating the alarm sequence.

To define sensor alarm set points and time delays, enter the appropriate High and Low set points and time delays in the appropriate High and Low fields. To generate an alarm when the control value exceeds the alarm set points, define the set points in the Alarms fields. To generate a notice when the control value exceeds the alarm set points, define the set points in the Notices fields. Sensor alarm set points may be defined as specific values for analog sensor inputs or simply as contact closed or contact open for digital input sensors.

Fault Alarm (IRLDS only) [Enabled/Disabled] [Enabled]

When the Fault Alarm is enabled, the RMCC generates a fault alarm whenever the input being monitored goes to 5Vdc (a sign that a flow fault has occurred in the corresponding IRLDS zone).

14.5. Alarm Overrides


4
6
ENT
ALARM OVERR DE SETPO NTS 12:00
No.: 01
Digital Override nput : 00
Turn Sensor Relay OFF : N
Type : F Duration : 00:00
Manual Override : NORM
Leave a Notice in Alarm Logs ? NO
↑=PREV ↓=NE T ->=SET-DATA 0=MENU

Normal sensor operation may be bypassed with Sensor Alarm Overrides. When the RMCC receives closure from the selected Alarm Override Input defined at the Input Definitions screens (see **Section 11.8.1.,** *Input Definitions*), the associated sensor will not perform an alarm sequence and if desired, will relay OFF to the controlled output. The Alarm Override Input and override settings are defined at the Alarm Overrides screen. Normal sensor operation is also manually bypassed at this screen.

No.

Selecting the Alarm Overrides command activates a sensor selection screen where users select the appropriate sensor number to be defined. The selected sensor number is then displayed at the Alarm Overrides screen in the No. field.

Digital Override Input [0 - 8]

Normal sensor operation is bypassed when the RMCC receives closure from an Alarm Override Input defined at the Input Definitions screens. Up to eight override inputs may be defined at the Input Definitions screens (**Section 11.8.1.,** *Input Definitions*). The Alarm Override Input that should control the override status of the selected sensor is chosen in the Digital Override Input field. To select an override input, enter the appropriate override number in the Digital Override Input field.

Turn Sensor Relay OFF [(Y)es, (N)o]

To deactivate the sensor relay to the controlled output when an Alarm Override is activated, enter “Y”es in the Turn Sensor Relay OFF field.

Type [(F)ixed, (T)imed]

There are three types of overrides: timed, fixed, and scheduled. A timed override bypasses the normal sensor operation for a specified period of time. A fixed override bypasses the normal sensor operation until the user returns to this screen and disables the override. A scheduled override bypasses the normal sensor operation according to a schedule configured at the Shut Off Schedule 1 screen (see **Section 11.5.5.,** *Shut Off Schedule 1*).

Duration [00:00 - 99:99]

The Override Duration is the specified measure of time the sensor will remain in override mode if the override is defined as a timed override.

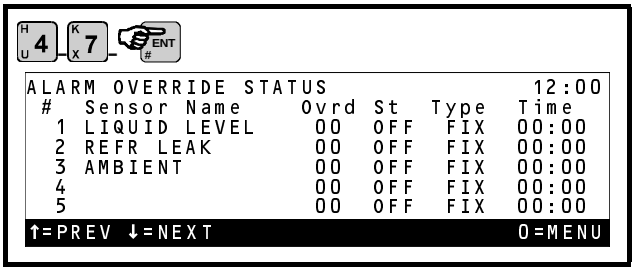
Manual Override [(N)ormal, (O)n, (O)ff]

Normal sensor operation may also be bypassed manually regardless of the Alarm Override Input status. A manual override is a fixed ON or OFF override and is activated in the Manual Override field. To activate a manual override, enter the desired override value in the Manual Override field. The selected sensor will remain in override mode until the user returns to this field and enters “N”ormal.

Leave a Notice in Alarm Logs? [(Y)es, (N)o]

The RMCC will record the date and time of each override to the Alarm Log when "Y" is entered in the Leave a Notice in Alarm Logs? field.

14.6. Alarm Override Status


ALARM OVERRIDE STATUS 12:00
Sensor Name Ovrd St Type Time
1 LIQUID LEVEL 00 OFF FIX 00:00
2 REFR LEAK 00 OFF FIX 00:00
3 AMBIENT 00 OFF FIX 00:00
4 00 OFF FIX 00:00
5 00 OFF FIX 00:00
↑=PREV ↓=NEXT 0=MENU

The status of all defined Sensor Alarm Overrides are displayed at the Alarm Override Status screen. Alarm Override Inputs are defined at the Input Definitions screens (see **Section 11.8.1.,** *Input Definitions*) and are assigned to a sensor at the Alarm Overrides screen (see Section 14.5. Alarm Overrides). Users may view the Sensor Name that contains the displayed override, the associated Alarm Override Input assigned to the sensor, the status of the override, the type of override defined to the displayed sensor, and if currently in override mode, the time remaining in the override duration.

#/Name

The # and Name fields display the sensor number and the sensor name respectively.

Ovrd

The Ovrd field displays the number of the alarm override input assigned to each sensor.

St

The St field displays the operational status (either ON or OFF) of the alarm override for each sensor.

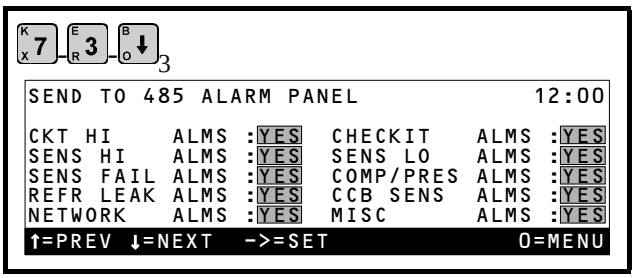
Type

The Type field shows whether the alarm override is fixed or timed for each sensor.

Time

For timed overrides, the amount of time remaining in the override duration is shown in the Time field.

14.7. Send to 485 Alarm Panel


SEND TO 485 ALARM PANEL 12:00
CKT HI ALMS :YES CHECKIT ALMS :YES
SENS HI ALMS :YES SENS LO ALMS :YES
SENS FAIL ALMS :YES COMP/PRES ALMS :YES
REFR LEAK ALMS :YES CCB SENS ALMS :YES
NETWORK ALMS :YES MISC ALMS :YES
↑=PREV ↓=NEXT ->=SET 0=MENU

If a Send Notices to 485 Alarm Panel field is set to YES, both alarms and notices for the alarm types within the category will be filtered. Users may keep notices from being sent to the panel by setting the Send Notices field in Section 11.8.3. to "N".

Using the Send to 485 Alarm Panel screen, users may choose which alarm types to send to the 485 Alarm Panel. Alarm types within a category marked with a YES will be sent to the 485 Alarm Panel; alarm types within a category marked with a NO will not be sent to the alarm panel.

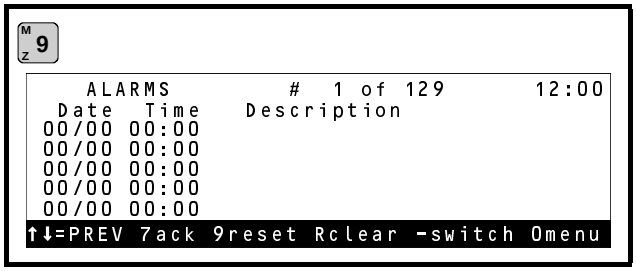
The ten different alarm filter categories and the alarm types within each category are listed below. For additional information on alarm types, see Table 14-1 on page 5.

- *Ckt Hi (Circuit High)* - This alarm type includes the Hi Temp and Hi Avg Temp alarms.
- *Checkit* - This alarm type includes the Check System Now and Check System Soon alarms.
- *Sens Hi (Sensor High)* - This alarm type includes the Hi Sens and Hi X-Ducer alarms generated by Sensor Control.
- *Sens Lo (Sensor Low)* - This alarm type includes the Lo Sens and Low Avg Temp alarms generated by sensor control.
- *Sens Fail (Sensor Fail)* - This alarm type includes the IRLDS Fault, Sensor Fail, Sensor Short, Sensor Open, Xducer Short, and Xducer Open alarms.

- *Comp/Pres (Compressor/Pressure Alarms)* - This alarm type includes the Auto-Reset, Discharge Tripped, Hi Suction, and Oil Pressure alarms.
- *Refr Leak (Refrigerant Leak)* - This alarm type includes the Leak alarm.
- *CCB Sens (CCB Sensors)* - This alarm type includes the Coil In, Coil Out, Coil2 In, and Coil2 Out alarms.
- *Network* - This alarm type includes the Bad Checksum, Bad Message, Device ONLINE, Host Bus Network Down, Missed Token, and No Response alarms.
- *Miscellaneous* - This alarm type includes all other alarm messages not covered in the first nine categories. These include the Condenser VS Fan Proof, Condenser VS Inv Fail, Defr Timed, Demand TimeOut, Dialout Unsuccessful, Dig. Alarm Override ON, Fan Proof, FP Level <999> Login, High Speed Proof, Hi Humidity, Hi Term, In Override, Inverter Fail, Lo Suction, Lo Xducer, Low Humidity, Low Speed Proof, Low Temp, Low Term, Manual Alarm Ovrride ON, Manual Defr, Manual Term, Ovrd Active, Ovrrd, Phase Fail, Phase Restored, Power Failed, Power Restored, Proof Fan <99>, Proof Failure, Pump Down, RM Level <999> Login, Reset, Run Proof, Sensor Open, Sensor Short, Setpoints Corrupted, Setpoint Restore Error, Xducer Open, Xducer Short, alarms.

  The Miscellaneous alarm type also includes all Hi and Lo alarms generated by Analog Input Modules.

14.8. Alarms



The RMCC Alarm Log is similar to other RMCC Logs in that it records specific occurrences within the RMCC according to the user-defined logging interval and stores the information for later review. Specifically, the RMCC Alarm Log displays all problems occurring in the RMCC at any given time.

The RMCC Alarm Log displays all notices and alarms generated within the RMCC. Alarms are displayed in order of occurrence with the most current alarm at the top of the first page. A notice is a low-level warning that signifies an abnormal facility or control system condition. A notice creates an entry in the RMCC Alarm Log and initiates no other signal. An alarm is a high-level warning that also signifies abnormal facility or control system conditions. An alarm appears in the RMCC Alarm Log and may be accompanied by a contact closure for on-site operation of a bell, light, or other notification device. Alarms may also be accompanied by an alarm dialout sequence and/or activation of the 485 Alarm Annunciator Panel.

Unacknowledged alarms (alarms indicated by an asterisk "*" in the RMCC Alarm Log) are active and must be archived, acknowledged, or reset to silence.

- When alarms are acknowledged, all alarm dialouts are discontinued and the alarms are maintained within the Alarm Log as acknowledged alarms. These alarms are signified by a dash "-" in the RMCC Alarm Log. If an alarm is acknowledged, the same alarm will not be generated or logged again.
- When alarms are archived, all alarm dialouts are discontinued and the alarms are maintained within the RMCC Alarm Log as archived alarms. These alarms are signified by a space in the log. If an alarm is archived, the same alarm will generate if the problem occurs again.
- When alarms are reset, all alarm dialouts are discontinued and all alarm records are cleared in the RMCC Alarm Log.

To acknowledge, archive, or reset the activated alarms within the RMCC Alarm Log, select the appropriate command at the RMCC Alarms screen.

Notice/Alarm Message	Description
Auto-Reset	The discharge pressure has fallen within an acceptable range as defined by the Autoreset set point (see **Section 11.2.10.,** *Group 1 Pressure Set Points*).
Bad Checksum	The RMCC has received three invalid messages from a case controller. This alarm may be due to improper network wiring (see **Section 5.2.,** *COM A and D Wiring*).
Bad Message	A problem has been detected on the I/O Network.
Check System Now	The alarm set point for a sensor defined as a Checkit monitor has been exceeded for the user-defined delay duration (see **Section 11.2.5.,** *Checkit Sensor Setup*).
Check System Soon	The notice set point for a sensor defined as a Checkit monitor has been exceeded for the user-defined delay duration (see **Section 11.2.5.,** *Checkit Sensor Setup*).
Coil In	A coil inlet sensor value is being generated by one of the sensor failure conditions described in **Section 5.3.1.10., *Fail-Safe Mode (Liquid Side Control Only)***.
Coil Out	A coil outlet sensor value is being generated by one of the sensor failure conditions described in **Section 5.3.1.10., *Fail-Safe Mode (Liquid Side Control Only)***.
Coil2 In	A coil 2 inlet sensor value is being generated by one of the sensor failure conditions described in **Section 5.3.1.10., *Fail-Safe Mode (Liquid Side Control Only)***.
Coil2 Out	A coil 2 outlet sensor value is being generated by one of the sensor failure conditions described in **Section 5.3.1.10., *Fail-Safe Mode (Liquid Side Control Only)***.
Condenser VS Fan Proof	A failure has been detected in a variable-speed condenser fan proof.
Condenser VS Inv Fail	A failure has been detected in the inverter of a variable-speed condenser.
Defr Timed	A defrost event has timed out based on the defrost duration set point (see **Section 11.4.17.,** *Circuit Setup 2*, or **Section 11.4.46.,** *Circuit Set Points 1 (Add/Edit Circuit)*).
Demand Time Out	The duration since the last defrost event has exceeded the Demand Defrost alarm time (see Section 11.4.20. Circuit Set Points 3, or **Section 11.4.48.,** *Circuit Set Points 3 (Add/Edit Circuit)*).
Device ONLINE	A defined communication board that was previously not responding has come back on line.
Dialout Unsuccessful	A user-defined dialout sequence has failed.
Dig. Alarm Override ON	A contact closure has been detected at an input configured as a digital override input (see Section 14.5. Alarm Overrides).
Discharge Tripped	The discharge pressure has exceeded the user-defined discharge trip point for a duration exceeding the trip delay (see **Section 11.2.10.,** *Group 1 Pressure Set Points*).
Fan <99> Proof	A failure has been detected in a single-speed condenser fan proof.
FP Level <999> Login	User has logged into the system at the front panel at the 100 through 400 level.
Hi Humidity	The high alarm value for a sensor defined as type “H” has been exceeded for the user-defined alarm delay duration (see Section 14.4. Sensor Alarm Setpoints).
Hi <I/O Module>	A high alarm set point for an Analog Input Module has been exceeded. Refer to *P/N 026-1002, UltraSite RMCC Supplement*, **Section 21.1,** *Viewing Alarms*.
High Avg Temp	The average temperature of all cases within a CCB case circuit is high. See Section 14.1. Alarm Set Points.
High Speed Proof	A failure has been detected in the high-speed fan proof of a double-speed condenser.
Hi Sens	The high alarm value for a sensor defined as any type other than “1”, “2”, “5”, or “H” has been exceeded for the user-defined alarm delay duration (see Section 14.4. Sensor Alarm Setpoints).
Hi Suction	The measured suction pressure has risen above the user-defined High Suction set point for a duration exceeding the high suction delay (see **Section 11.2.3.,** *Group 1 Pressure Alarms Setup*).

Table 14-1 *- RMCC Alarm Log Notice and Alarm Messages*

Notice/Alarm Message	Description
Hi Temp	The high alarm value for an input defined as a circuit temperature sensor (01 TEMP # - 48 TEMP #; see **Section 11.8.1.,** *Input Definitions*) has been exceeded for the user-defined alarm delay duration, see **Section 11.4.12.,** *Alarm Set Points*.
Hi Term	The high alarm value for an input defined as a circuit defrost termination sensor (01 TEMP # - 48 TEMP #; see **Section 11.8.1.,** *Input Definitions*) has been exceeded for the user-defined alarm delay duration see **Section 11.4.12.,** *Alarm Set Points*.
Hi Xducer	The high alarm value for a sensor defined as either "1", "2", or "5" has been exceeded for the user-defined alarm delay duration (see **Section 14.4.,** *Sensor Alarm Setpoints*).
Host Bus Network Down	The RMCC cannot connect to the 485 Alarm box or to other REFLECS controllers on the Host Bus COM B network.
In Override	A manual override has been initiated at the Manual Defrost screen (see **Section 11.4.13.,** *Manual Defrost,* or **Section 11.4.44.,** *Circuit Setup 1 (Add/Edit Circuit)*).
Inverter Fail	A contact closure has been detected from an input defined as a compressor inverter fail alarm (VS1 INVALM-VS4 INVALM) (see **Section 11.8.1.,** *Input Definitions*).
IRLDS Fault	A system fault alarm has been detected on an IRLDS unit. See **Section 14.4.,** *Sensor Alarm Setpoints*.
Leak	An analog signal read from the optional leak sensor input on a CCB has exceeded the leak alarm level set point for the duration specified in the leak alarm delay field (see **Section 11.4.32.,** *CCB Set Point Screen 2 (Liquid Pulse and Stepper Only)*).
Lo Avg Temp	The average temperature of all cases in a CCB circuit is low. See **Section 14.1.,** *Alarm Set Points*.
Lo <I/O Module>	A low alarm set point for an Analog Input Module has been exceeded. Refer to *P/N 026-1002, UltraSite RMCC Supplement,* **Section 21.1,** *Viewing Alarms*.
Lo Sens	The sensor reading has fallen below the low alarm value for a sensor defined as any type other than "1", "2", or "5" for the user-defined alarm delay duration (see **Section 14.8.,** *Alarms*).
Lo Suction	The measured suction pressure has fallen below the user-defined low Suction set point for a duration exceeding the low suction delay (see **Section 11.2.3.,** *Group 1 Pressure Alarms Setup*).
Low Speed Proof	A failure has been detected in the low-speed fan proof of a double-speed condenser.
Lo Xducer	The sensor reading has fallen below the low alarm value for a sensor defined as either "1", "2", or "5" for the user-defined alarm delay duration (see **Section 14.4.,** *Sensor Alarm Setpoints*).
Low Humidity	The sensor reading has fallen below the low alarm value for a sensor defined as type "H" for the user-defined alarm delay duration (see **Section 14.4.,** *Sensor Alarm Setpoints*).
Low Temp	The circuit control temperature has fallen below the low alarm value for an input defined as a circuit temperature sensor (01 TEMP # - 48 TEMP #; see **Section 11.8.1.,** *Input Definitions*) for the user-defined alarm delay duration (see **Section 14.1.,** *Alarm Set Points*).
Low Term	The circuit control temperature has fallen below the low alarm value for an input defined as a circuit defrost termination sensor (01 TEMP # - 48 TEMP #; see **Section 11.8.1.,** *Input Definitions*) for the user-defined alarm delay duration (see **Section 14.1.,** *Alarm Set Points*).
Manual Defr	A manual defrost has been initiated at the Manual Defrost screen (see **Section 11.4.13.,** *Manual Defrost,* or **Section 11.4.39.,** *Manual Defrost*).
Manual Term	A defrost event has been terminated at the Manual Defrost screen (see **Section 11.4.13.,** *Manual Defrost*).
No Response	A defined communication board cannot be located.
Oil Pressure	The oil pressure in a compressor has risen above the oil pressure defined at the group setup screen (see **Section 11.2.7.,** *Group 1 Setup*).
OVRD ACTIVE	A contact closure has been detected at an input defined as an alarm override (ALARM OVD1-ALARM OVD8) (see **Section 11.8.1.,** *Input Definitions* and **Section 14.5.,** *Alarm Overrides*).
Ovrrd	A contact closure has been detected at an input defined as a clean switch (CLEANSW) (see **Section 11.2.8.,** *Pressure Setup*, and **Section 11.8.1.,** *Input Definitions*).

Table 14-1 *- RMCC Alarm Log Notice and Alarm Messages*

Notice/Alarm Message	Description
Phase Fail	A contact closure has been detected at an input defined as a phase loss device (PHASE LOSS) (see **Section 11.2.8.,** *Pressure Setup*, and **Section 11.8.1.,** *Input Definitions*).
Phase Restored	A open contact has been detected at an input defined as a phase loss device (PHASE LOSS) (see **Section 11.2.8.,** *Pressure Setup*, and **Section 11.8.1.,** *Input Definitions*).
Power Failed	Power loss detected at the unit.
Power Restored	Power restored at the unit.
Pump Down	The measured suction pressure has fallen below the user-defined Pump Down set point (see **Section 11.2.3.,** *Group 1 Pressure Alarms Setup*).
RM Level <999> Login	User has logged into the system from a remote location at the 100 through 400 level.
Reset	RMCC has been reset without a power loss.
Run Proof	A contact closure has been detected—within the proof delay duration—at an input defined as a compressor proof device (CMP01 PRF - CMP22 PRF) (see **Section 11.8.1.,** *Input Definitions*, and **Section 11.2.3.,** *Group 1 Pressure Alarms Setup*).
Sensor Short	A short has been detected at a sensor input connection (SENS01 - SENS48) (see **Section 11.8.1.,** *Input Definitions*).
Sensor Open	An open circuit has been detected at a sensor input connection (SENS01 - SENS48) (see **Section 11.8.1.,** *Input Definitions*).
Setpoints Corrupted	Invalid set points detected within the RMCC.
Setpoint Restore Error	Error detected while restoring RMCC set points from a backup copy.
Xducer Short	A short has been detected at a transducer input connection.
Xducer Open	An open circuit has been detected at a transducer input connection.

Table 14-1 *- RMCC Alarm Log Notice and Alarm Messages*

15 Hand-Held Terminal Screens

The operational status and settings of a Case Control Board may be viewed or changed by using a CPC hand-held terminal (HHT). When an HHT is plugged into a CCB, users may access a series of screens that display defrost, anti-sweat, case light, override, door switch, and valve status information. Certain control parameters, such as offsets, set points, and dead bands, may also be changed in these screens. The HHT may also be used to initiate manual defrost overrides and to manually bypass case lights.

The UP and DOWN keys on the HHT keypad are used to scroll through the screens. The DOWN key scrolls forward through the screens, and the UP key scrolls backward. The screens wrap around; therefore, users may jump from the last screen to the first screen by pressing DOWN, or from the first screen to the last screen by pressing UP.

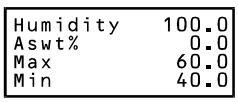
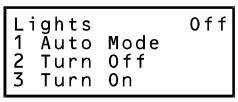
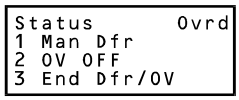
Some screens will have fields that may be changed using the HHT. To change the value in a field, press the RIGHT arrow key. A cursor will appear in the screen next to the first changeable field in the display. Use the UP and DOWN arrow keys to move the cursor to the desired field, and enter the desired value using the numeric keypad. When finished, use the UP and DOWN arrow keys to move the cursor off the screen.

The F1 and F2 keys are defined as shortcut keys. When F1 is pressed, the display jumps to Screen 1, showing the case type, the software revision, the system status, and the time. When F2 is pressed, the display jumps to the override screen, where users may initiate manual defrost, terminate defrost mode, or override the system off.

The following sections show the HHT screens for all CCB types currently available.

15.1. Liquid Pulse HHT Screens

#	Screen View	Functional Description
1	Case Type SPAR Rev 6.01P Status Ovrd Time 00:00	*Case Type* - the four-letter case type code. See **Section 11.4.16.,** *Circuit Setup 1* for a complete table of codes. *Rev* - the software revision number. *Status* - the system is operating in either of five modes: refrigeration on (On), refrigeration off (Off), defrost on (MDfr), recovery mode (Rcvy), or override mode (Ovrd). *Time* - the current time (in 24-hour format).
2	Disch Air OPEN Setpt 0.0 Case dF OPEN Case Offset 0.0	*Disch Air* - the current discharge air temperature reading. *Setpt* - the discharge air set point. This may be changed with the HHT. *Case dF* - the current case temperature in degrees Fahrenheit. *Case Offset* - the case temperature sensor offset. This may be changed with the HHT.
3	Supht 1 ---- Setpt 8.0 Valve 1 % 0.0 Case dF OPEN	*Supht 1* - the superheat of coil 1. *Setpt* - the superheat set point for coil 1. *Valve 1%* - the current valve opening percentage. *Case dF* - the case temperature in degrees Fahrenheit.
4	Coil 1 In OPEN Offset 0.0 Coil 1 Out OPEN Offset 0.0	*Coil 1 In* - the coil 1 in temperature. *Offset* - the coil 1 in temp sensor offset. This may be changed with the HHT. *Coil 1 Out* - the coil 1 out temperature. *Offset* - the coil 1 out temp sensor offset.This may be changed with the HHT.
5	Supht 2 ---- Setpoint 8.0 Valve 2 % 0.0 Case dF OPEN	This screen is identical to Screen 3, except it applies to valve 2 and coil 2 (if applicable).
6	Coil 2 In OPEN Offset 0.0 Coil 2 Out OPEN Offset 0.0	This screen is identical to Screen 4, except it applies to valve 2 and coil 2 (if applicable).
7	Defr 00:00 Failsafe 00:00 Term 0.0 Setpt 48.0	*Defr* - When in defrost, this field shows the number of minutes and seconds the circuit has been in defrost. This number will be equal to the fail-safe time when not in defrost. *Failsafe* - the maximum number of minutes and seconds defrost mode will remain active. *Term* - the termination temperature sensor reading. *Setpt* - the termination temperature set point.
8	Defr #1 NONE Defr #2 NONE Defr #3 NONE Defr #4 NONE	*Defr #1-Defr #4* - the first four scheduled defrost times.
9	Defr #5 NONE Defr #6 NONE Drip 00:00 Set Time 00:00	*Defr #5-Defr #6* - the fifth and sixth scheduled defrost times. *Drip* - When in drain mode, this field shows the number of minutes and seconds the circuit has been draining. This number will be equal to the set time when not in drip mode. *Set Time* - the amount of time moisture on the coil is allowed to drain after defrost.

#	Screen View	Functional Description
10		*Humidity* - the humidity sensor reading. *Aswt%* - the percentage at which the anti-sweat heaters are operating. *Max* - the humidity above which the anti-sweat heater will remain on at all times. *Min* - the humidity below which the anti-sweat heater will remain off at all times.
11		*Lights* - the current status of the case lights. Pressing RIGHT followed by one of the commands below allows users to bypass the case lights: *1 Auto* - Pressing 1 will return the case lights to automatic operation. *2 Turn Off* - Pressing 2 will bypass the case lights off. *3 Turn On* - Pressing 3 will bypass the case lights on.
12		*Supht SP* - the current superheat set point. This value may be changed using the HHT. *Sens* - the valve's sensitivity value. This may be changed using the HHT. See **Section 5.3.1.3., *Valve Control*** for a complete definition of sensitivity. *RcvyLevel* - This number is equal to the recovery valve percentage (see **Section 11.4.29.,** *CCB Set Point Screen 1 (Liquid Pulse and Stepper Only)*) divided by 10. This may be changed using the HHT. *MaxRcvy Sec* - the maximum number of seconds the CCB will operate in recovery mode. This number may be changed using the HHT.
13		*Disch Air* - the current discharge air temperature reading. *Offset* - the discharge air temperature sensor offset. This may be changed with the HHT. *Ret Air* - the current return air temperature reading. *Offset* - the return air temperature sensor offset. This may be changed with the HHT.
14		*Status* - the operational status of the refrigeration and defrost modes. Pressing RIGHT followed by one of the commands below allows users to manually override the case. *1 Man Dfr* - Pressing 1 initiates manual defrost. *2 OV OFF* - Pressing 2 overrides both refrigeration and defrost OFF. *3 End Dfr/OV* - Pressing 3 will terminate defrost mode.

#	Screen View	Functional Description
15	Door OPEN Frost SHRT Refr Leak 0.0 Offset	*Door* - the current status of the door switch. *Frost* - the demand defrost sensor status. *Refr Leak* - the ppm concentration of refrigerant currently being detected by the leak sensor. *Offset* - the leak sensor offset. This value may be changed using the HHT.
16	Case Dbd 0.6 Close Rate % 255 OV Type Man Kd x10 0	*Case Dbd* - the dead band for the case temperature. This value may be changed using the HHT. *Close Rate* - the rate of closure for the valve is shown in this field. This value may be changed using the HHT. *OV Type* - the type of override currently being executed. Four different messages may appear here: "None" for no override, "Timed" for timed override, "Swtch" for door switch overrides, and "Man" for manual overrides. *Kd x10* - The derivative gain value for the valve multiplied by ten. See **Section 11.4.36.,** *CCB Set Point Screen 4 (Liquid Pulse and Stepper Only)* for a complete definition of derivative gain.
17	Control EEV Valve Type Puls Network OFF	*Control* - the valve control type. This should read EEV. *Valve Type* - the valve type. This should read Puls (pulse). *Network* - whether the control network is ON or OFF.
18	CO Fan Lock 100 Valve Filt 100	*CO Fan Lock* - the coil-out fan lockout temperature set point. See **Section 11.4.36.,** *CCB Set Point Screen 4 (Liquid Pulse and Stepper Only)* for more information. *Valve Filt* - the valve filter percentage. See **Section 5.3.1.2., *Temperature Control***, for more information.
19	Case Type 0 Case # 0 Valve Mul 100 Bypass Vlv% 30	*Case Type* - the case type number. See **Section 11.4.16.,** *Circuit Setup 1* for a complete list of case types and their corresponding numbers. This may be changed using the HHT. *Case #* - the CCB number. *Vlv Mul* - the valve multiplier. See **Section 11.4.37.,** *CCB Set Points Screen 4 (CPC Suction Stepper Only)* for more information. *Byp Vlv%* - the percentage at which the EEV will remain open during fail-safe mode.

15.2. Liquid Stepper HHT Screens

#	Screen View	Functional Description
1	Case Type SPAR Rev 6.02L Status Ovrd Time 00:00	*Case Type* - the four-letter case type code. See **Section 11.4.16.,** *Circuit Setup 1* for a complete table of codes. *Rev* - the software revision number. *Status* - the system is operating in either of five modes: refrigeration on (On), refrigeration off (Off), defrost on (MDfr), recovery mode (Rcvy), or override mode (Ovrd). *Time* - the current time (in 24-hour format).
2	Disch Air OPEN Setpt 0.0 Case dF OPEN CaseOffset 0.0	*Disch Air* - the current discharge air temperature reading. *Setpt* - the discharge air set point. This may be changed with the HHT. *Case dF* - the current case temperature in degrees Fahrenheit. *Case Offset* - the case temperature sensor offset. This may be changed with the HHT.
3	Supht 1 ---- Setpt 8.0 Valve 1 % 0.0 Case dF OPEN	*Supht 1* - the superheat of coil 1. *Setpt* - the superheat set point for coil 1. *Valve 1%* - the current valve opening percentage. *Case dF* - the case temperature in degrees Fahrenheit.

#	Screen View	Functional Description
4	Coil 1 In OPEN Offset 0.0 Coil 1 Out OPEN Offset 0.0	*Coil 1 In* - the coil 1 in temperature. *Offset* - the coil 1 in temp sensor offset. This may be changed with the HHT. *Coil 1 Out* - the coil 1 out temperature. *Offset* - the coil 1 out temp sensor offset.This may be changed with the HHT.
5	Defr 00:00 Failsafe 00:00 Terminate 0.0 Setpoint 48.0	*Defr* - When in defrost, this field shows the number of minutes and seconds the circuit has been in defrost. This number will be equal to the fail-safe time when not in defrost. *Failsafe* - the maximum number of minutes and seconds defrost mode will remain active. *Term* - the termination temperature sensor reading. *Setpt* - the termination temperature set point.
6	Defr #1 NONE Defr #2 NONE Defr #3 NONE Defr #4 NONE	*Defr #1-Defr #4* - the first four scheduled defrost times.
7	Defr #5 NONE Defr #6 NONE Drip 00:00 Set Time 00:00	*Defr #5-Defr #6* - the fifth and sixth scheduled defrost times. *Drip* - When in drain mode, this field shows the number of minutes and seconds the circuit has been draining. This number will be equal to the set time when not in drip mode. *Set Time* - the amount of time moisture on the coil is allowed to drain after defrost.
8	Humidity 100.0 Aswt% 0.0 Max 60.0 Min 40.0	*Humidity* - the humidity sensor reading. *Aswt%* - the percentage at which the anti-sweat heaters are operating. *Max* - the humidity above which the anti-sweat heater will remain on at all times. *Min* - the humidity below which the anti-sweat heater will remain off at all times.
9	Lights Off 1 Auto 2 Turn Off 3 Turn On	*Lights* - the current status of the case lights. Pressing RIGHT followed by one of the commands below allows users to bypass the case lights. *1 Auto* - Pressing 1 will return the case lights to automatic operation. *2 Turn Off* - Pressing 2 will bypass the case lights off. *3 Turn On* - Pressing 3 will bypass the case lights on.
10	Supht SP 8.0 Sens 4 RcvyLevel 7 MaxRcvy Sec 240	*Supht SP* - the current superheat set point. This value may be changed using the HHT. *Sens* - the valve's sensitivity value. This may be changed using the HHT. See **Section 5.3.1.3., *Valve Control*** for a complete definition of sensitivity. *RcvyLevel* - This number is equal to the recovery valve percentage (see **Section 11.4.29.,** *CCB Set Point Screen 1 (Liquid Pulse and Stepper Only)*) divided by 10. This may be changed using the HHT. *MaxRcvy Sec* - the maximum number of seconds the CCB will operate in recovery mode. This number may be changed using the HHT.
11	Disch Air OPEN Offset 0.0 Ret Air OPEN Offset 0.0	*Disch Air* - the current discharge air temperature reading. *Offset* - the discharge air temperature sensor offset. This may be changed with the HHT. *Ret Air* - the current return air temperature reading. *Offset* - the return air temperature sensor offset. This may be changed with the HHT.
12	Status Ovrd 1 Man Dfr 2 OV OFF 3 End Dfr/OV	*Status* - the operational status of the refrigeration and defrost modes. Pressing RIGHT followed by one of the commands below allows users to manually override the case. *1 Man Dfr* - Pressing 1 initiates manual defrost. *2 OV OFF* - Pressing 2 overrides both refrigeration and defrost OFF. *3 End Dfr/OV* - Pressing 3 will terminate defrost mode.

#	Screen View	Functional Description
13	Door OPEN Frost SHRT Refr Leak 0.0 Offset	*Door* - the current status of the door switch. *Frost* - the demand defrost sensor status. *Refr Leak* - the ppm concentration of refrigerant currently being detected by the leak sensor. *Offset* - the leak sensor offset. This value may be changed using the HHT.
14	Case Dbd 0.6 Close Rate % 255 OV Type Man Kd x10 0	*Case Dbd* - the dead band for the case temperature. This value may be changed using the HHT. *Close Rate* - the rate of closure for the valve. This value may be changed using the HHT. *OV Type* - the type of override currently being executed. Four different messages may appear here: "None" for no override, "Timed" for timed override, "Swtch" for door switch overrides, and "Man" for manual overrides. *Kd x10* - The derivative gain value for the valve multiplied by 10. See **Section 11.4.37.,** *CCB Set Points Screen 4 (CPC Suction Stepper Only)* for a complete definition of derivative gain.
15	Step Deflt 0 1 Alco EEV 2 Spor EEPR 3 Reset	*Step Deflt* - By pressing RIGHT and selecting one of the options below, the hysteresis, max step rate, and maximum steps values are automatically programmed with appropriate default parameters for Alco EEVs or Sporlan EEPRs. These values may also be reset. *1 Alco EEV* - Hysteresis is set at 0, Max Step Rate at 33, and Max Steps at 384. *2 Sporlan EEPR* - Hysteresis is set at 10, Max Step Rate at 100, and Max Steps at 2500. *3 Reset* - Hysteresis is set at 0, Max Step Rate at 100, and Max Steps at 0.
16	Step Hyst 0 Step Hz 100 Max Steps 0	If a default setting was chosen using **Screen 15,** the default values will be displayed in this screen. They may be changed at this screen using the HHT. *Step Hyst* - the hysteresis value. See **Section 11.4.38.,** *CCB Stepper Set Points Screen (Stepper Only)* for a definition of hysteresis. *Step Hz* - the maximum number of steps per second the valve may open or close. *Max Steps* - the number of steps in between closed (0%) and open (100%).
17	Control EEV Valve Type Step Valve Jmpr BiPo Network OFF	*Control* - the valve control type. This should read EEV (electronic expansion valve). *Valve Type* - the valve type. This should read Step (stepper). *Valve Jmpr* - whether the CCB's valve jumper is set for unipolar (UniP) or bipolar (BiPo) operation. See **Section 5.3.1.3.,** ***Valve Control***. *Network* - whether the host network is ON or OFF.
18	CO Fan Lock 100 Valve Filt 100	*CO Fan Lock* - the coil-out fan lockout temperature set point. See **Section 11.4.36.,** *CCB Set Point Screen 4 (Liquid Pulse and Stepper Only)* for more information. *Valve Filt* - the valve filter percentage. See **Section 5.3.1.2.,** ***Temperature Control***, for more information.
19	Case Type 0 Case # 0 Valve Mul 100 Bypass Vlv% 30	*Case Type* - the case type number. See **Section 11.4.16.,** *Circuit Setup 1* for a complete list of case types and their corresponding numbers. This may be changed using the HHT. *Case #* - the CCB number. *Vlv Mul* - the valve multiplier. See **Section 11.4.37.,** *CCB Set Points Screen 4 (CPC Suction Stepper Only).* *Byp Vlv%* - the percentage at which the EEV will remain open during fail-safe mode.

15.3. CPC Suction Stepper Valves

#	Screen View	Functional Description
1	Case Type SPAR Rev 6.02C Status Ovrd Time 00:00	*Case Type* - the four-letter case type code. See **Section 11.4.16.,** *Circuit Setup 1* for a complete table of codes. *Rev* - the software revision number. *Status* - the system is operating in either of five modes: refrigeration on (On), refrigeration off (Off), defrost on (MDfr), recovery mode (Rcvy), or override mode (Ovrd). *Time* - the current time (in 24-hour format).
2	Setpt 0.0 CaseOffset 0.0 Valve 1 % -1.0 Ctrl Temp None	*Setpt* - the current control temperature set point. This may be changed using the HHT. *CaseOffset* - the sensor offset for the control temperature. This may be changed using the HHT. *Valve 1 %* - the current opening percentage of the valve. *Ctrl Temp* - the current calculated control temperature reading.
3	Disch 1 OPEN Disch 2 OPEN Disch 3 OPEN Disch 4 OPEN	*Disch 1 - Disch 4* - the current readings of discharge air temperature sensors one through four.
4	Defr 00:00 Failsafe 00:00 Term 0.0 Setpt 48.0	*Defr* - the defined defrost duration. *Failsafe* - this shows the demand defrost fail-safe time. *Term* - the termination temperature sensor reading. *Setpt* - the termination temperature set point.
5	Humidity 100.0 Aswt% 0.0 Max 60.0 Min 40.0	*Humidity* - the humidity sensor reading. *Aswt%* - the percentage at which the anti-sweat heaters are operating. *Max* - the humidity above which the anti-sweat heater will remain on at all times. *Min* - the humidity below which the anti-sweat heater will remain off at all times.
6	Lights Off 1 Auto 2 Turn Off 3 Turn On	*Lights* - the current status of the case lights. Pressing RIGHT followed by one of the commands below allows users to bypass the case lights. *1 Auto* - Pressing 1 will return the case lights to automatic operation. *2 Turn Off* - Pressing 2 will bypass the case lights off. *3 Turn On* - Pressing 3 will bypass the case lights on.
7	Status Ovrd 1 Man Dfr 2 OV OFF 3 End Dfr/OV	*Status* - the operational status of the refrigeration and defrost modes. Pressing RIGHT followed by one of the commands below allows users to manually override the case. *1 Man Dfr* - Pressing 1 initiates manual defrost. *2 OV OFF* - Pressing 2 overrides both refrigeration and defrost OFF. *3 End Dfr/OV* - Pressing 3 will terminate defrost mode.
8	Disch 1 OPEN Offset 0.0 Disch 2 OPEN Offset 0.0	*Disch 1* - the current reading of discharge air temperature sensor one. *Offset* - the offset for discharge air sensor one. This may be changed using the HHT. *Disch 2* - the current reading of discharge air temperature sensor two. *Offset* - the offset for discharge air sensor two. This may be changed using the HHT.
9	Disch 3 OPEN Offset 0.0 Disch 4 OPEN Offset 0.0	*Disch 3* - the current reading of discharge air temperature sensor three. *Offset* - the offset for discharge air sensor three. This may be changed using the HHT. *Disch 4* - the current reading of discharge air temperature sensor four. *Offset* - the offset for discharge air sensor four. This may be changed using the HHT.

#	Screen View	Functional Description
10	Extra 1 Tmp OPEN Offset 0.0 Extra 2 Tmp OPEN Offset 0.0	*Extra 1 Tmp* - the current reading of extra temperature sensor one. *Offset* - the offset for extra temperature sensor one. *Extra 2 Tmp* - the current reading of extra temperature sensor two. *Offset* - the offset for extra temperature sensor two.
11	Door OPEN Frost SHRT Refr Leak 0.0 Offset	*Door* - the current status of the door switch. *Frost* - the demand defrost sensor status. *Refr Leak* - the ppm concentration of refrigerant currently being detected by the leak sensor. *Offset* - the leak sensor offset. This value may be changed using the HHT.
12	Step Deflt 0 1 Alco EEV 2 Spor EEPR 3 Reset	*Step Deflt* - By pressing RIGHT and selecting one of the options below, the hysteresis, max step rate, and maximum steps values are automatically programmed with appropriate default parameters for Alco EEVs or Sporlan EEPRs. These values may also be reset. *1 Alco EEV* - Hysteresis is set at 0, Max Step Rate at 33, and Max Steps at 384. *2 Sporlan EEPR* - Hysteresis is set at 10, Max Step Rate at 100, and Max Steps at 2500. *3 Reset* - Hysteresis is set at 0, Max Step Rate at 100, and Max Steps at 0.
13	Step Hyst 0 Step Hz 100 Max Steps 0	If a default setting was chosen using **Screen 12,** the default values will be displayed in this screen. They may be changed at this screen using the HHT. *Step Hyst* - the hysteresis value. See **Section 11.4.38.,** *CCB Stepper Set Points Screen (Stepper Only)* for a definition of hysteresis. *Step Hz* - the maximum number of steps per second the valve may open or close. *Max Steps* - the number of steps in between closed (0%) and open (100%).
14	Control EEPR Valve Type Step Valve Jmpr UniP Network OFF	*Control* - the valve control type. This should read EEPR (electronic evaporator pressure regulator). *Valve Type* - the valve type. This should read Step (stepper). *Valve Jmpr* - whether the CCB's valve jumper is set for unipolar (UniP) or bipolar (BiPo) operation. See **Section 5.3.1.3.,** ***Valve Control***. *Network* - whether the host network is ON or OFF.
15	Sens 4 Kd x10 0 UpdateRate 6	*Sensitivity* - the valve's sensitivity value. This may be changed using the HHT. See **Section 5.3.1.3.,** ***Valve Control*** for a complete definition of sensitivity. *Kd x10* - the derivative gain value for the valve multiplied by ten. See **Section 11.4.37.,** *CCB Set Points Screen 4 (CPC Suction Stepper Only)* for a complete definition of derivative gain. *UpdateRate* - the valve's update rate. See **Section 5.3.1.2.,** ***Temperature Control*** for more information.
16	Ctrl Type 0 Ctrl Type AVG	*Ctrl Type* - the method the CCB uses to combine the discharge air sensors into a control temperature value. Pressing RIGHT followed by a 0, 1, or 2 will define the combination strategy. *(0) AVG* - The control temperature is the average of all the discharge sensor readings. *(1) MIN* - The control temperature is the lowest of all the discharge sensor readings. *(2) MAX* - The control temperature is the highest of all the discharge sensor readings.
17	Case Type 0 Case No. 0	*Case Type* - the case type number. See **Section 11.4.16.,** *Circuit Setup 1* for a complete list of case types and their corresponding numbers. This may be changed using the HHT. *Case #* - the CCB number.

15.4. Hussmann Suction Stepper HHT Screens

#	Screen View	Functional Description
1	Case Type SPAR Rev 6.01P Status Ovrd Time 00:00	*Case Type* - the four-letter case type code. See **Section 11.4.16.,** *Circuit Setup 1* for a complete table of codes. *Rev* - the software revision number. *Status* - the system is operating in either of five modes: refrigeration on (On), refrigeration off (Off), defrost on (MDfr), recovery mode (Rcvy), or override mode (Ovrd). *Time* - the current time (in 24-hour format).
2	Setpt 0.0 CaseOffset 0.0 Valve 1 % 0.0 Disch Avg None	*Setpt* - the current control temperature set point. This may be changed using the HHT. *CaseOffset* - the sensor offset for the control temperature. This may be changed using the HHT. *Valve 1 %* - the current opening percentage of the valve. *Disch Avg* - the average of the discharge air sensor readings.
3	Disch 1 OPEN Disch 2 OPEN Disch 3 OPEN Disch 4 OPEN	*Disch 1 - Disch 4* - the current readings of discharge air temperature sensors one through four.
4	Defr 00:00 Failsafe 00:00 Term 0.0 Setpt 48.0	*Defr* - When in defrost, this field shows the number of minutes and seconds the circuit has been in defrost. This number will be equal to the fail-safe time when not in defrost. *Failsafe* - the maximum number of minutes and seconds defrost mode will remain active. *Term* - the termination temperature sensor reading. *Setpt* - the termination temperature set point.
5	Defr #1 NONE Defr #2 NONE Defr #3 NONE Defr #4 NONE	*Defr #1-Defr #4* - the first four scheduled defrost times.
6	Defr #5 NONE Defr #6 NONE Drip 00:00 Set Time 00:00	*Defr #5-Defr #6* - the fifth and sixth scheduled defrost times. *Drip* - When in drain mode, this field shows the number of minutes and seconds the circuit has been draining. This number will be equal to the set time when not in drip mode. *Set Time* - the amount of time moisture on the coil is allowed to drain after defrost.
7	Humidity 100.0 Aswt% 0.0 Max 60.0 Min 40.0	*Humidity* - The humidity sensor reading. *Aswt%* - The percentage at which the anti-sweat heaters are operating. *Max* - The humidity above which the anti-sweat heater will remain on at all times. *Min* - The humidity below which the anti-sweat heater will remain off at all times.
8	Lights Off 1 Auto 2 Turn Off 3 Turn On	*Lights* - the current status of the case lights. Pressing RIGHT followed by one of the commands below allows users to bypass the case lights. *1 Auto* - Pressing 1 will return the case lights to automatic operation. *2 Turn Off* - Pressing 2 will bypass the case lights off. *3 Turn On* - Pressing 3 will bypass the case lights on.
9	Status Ovrd 1 Man Dfr 2 OV OFF 3 End Dfr/OV	*Status* - the operational status of the refrigeration and defrost modes. Pressing RIGHT followed by one of the commands below allows users to manually override the case. *1 Man Dfr* - Pressing 1 initiates manual defrost. *2 OV OFF* - Pressing 2 overrides both refrigeration and defrost OFF. *3 End Dfr/OV* - Pressing 3 will terminate defrost mode.

#	Screen View	Functional Description
10	Disch 1 OPEN Offset 0.0 Disch 2 OPEN Offset 0.0	*Disch 1* - the current reading of discharge air temperature sensor one. *Offset* - the offset for discharge air sensor one. This may be changed using the HHT. *Disch 2* - the current reading of discharge air temperature sensor two. *Offset* - the offset for discharge air sensor two. This may be changed using the HHT.
11	Disch 3 OPEN Offset 0.0 Disch 4 OPEN Offset 0.0	*Disch 3* - the current reading of discharge air temperature sensor three. *Offset* - the offset for discharge air sensor three. This may be changed using the HHT. *Disch 4* - the current reading of discharge air temperature sensor four. *Offset* - the offset for discharge air sensor four. This may be changed using the HHT.
12	Extra 1 Tmp OPEN Offset 0.0 Extra 2 Tmp OPEN Offset 0.0	*Extra 1 Tmp* - the current reading of extra temperature sensor one. *Offset* - the offset for extra temperature sensor one. *Extra 2 Tmp* - the current reading of extra temperature sensor two. *Offset* - the offset for extra temperature sensor two.
13	Door OPEN Frost SHRT Refr Leak 0.0 Offset	*Door* - the current status of the door switch. *Frost* - the demand defrost sensor status. *Refr Leak* - the ppm concentration of refrigerant currently being detected by the leak sensor. *Offset* - the leak sensor offset. This value may be changed using the HHT.
14	Step Deflt 0 1 Alco EEV 2 Spor EEPR 3 Reset	*Step Deflt* - By pressing RIGHT and selecting one of the options below, the hysteresis, max step rate, and maximum steps values are automatically programmed with appropriate default parameters for Alco EEVs or Sporlan EEPRs. These values may also be reset. *1 Alco EEV* - Hysteresis is set at 0, Max Step Rate at 33, and Max Steps at 384. *2 Sporlan EEPR* - Hysteresis is set at 10, Max Step Rate at 100, and Max Steps at 2500. *3 Reset* - Hysteresis is set at 0, Max Step Rate at 100, and Max Steps at 0.
15	Step Hyst 0 Step Hz 100 Max Steps 0	If a default setting was chosen using **Screen 14,** the default values will be displayed in this screen. They may be changed at this screen using the HHT. *Step Hyst* - the hysteresis value. See **Section 11.4.37.,** *CCB Set Points Screen 4 (CPC Suction Stepper Only)* for a definition of hysteresis. *Step Hz* - the maximum number of steps per second the valve may open or close. *Max Steps* - the number of steps in between closed (0%) and open (100%).
16	Control EEPR Valve Type Step Valve Jmpr UniP Network OFF	*Control* - whether the valve is an EEV or and EEPR. *Valve Type* - whether the valve is a pulse or stepper. *Valve Jmpr* - whether the CCB's valve jumper is set for unipolar (UniP) or bipolar (BiPo) operation. See **Section 5.3.1.3.,** ***Valve Control***. *Network* - whether the host network is ON or OFF.
17	Case Type 0 Case No. 0	*Case Type* - the case type number. See **Section 11.4.16.,** *Circuit Setup 1* for a complete list of case types and their corresponding numbers. This may be changed using the HHT. *Case #* - the CCB number.

Appendix A: Advanced Pressure Control (RMCT 2.10)

CPC manufactures a companion version of the RMCC v. 2.10 software that incorporates the advanced pressure control system developed by Tyler Refrigeration. This software is designated as RMCT 2.10. The two versions are identical except for a few aspects of pressure control:

RMCC	RMCT
Maximum of 4 suction groups	Maximum of 3 suction groups
Maximum of 16 compressors per group	Maximum of 10 compressors per group
Normal strategy uses PID control	Normal strategy uses PIDA control (see ***PIDA Control,*** below)
Variable-speed compressors optional	Variable-speed compressor **required** for each group
Fixed Steps strategy and Alternate variable-speed strategies available	Only Normal variable-speed strategy is used—no Fixed Steps strategy is available
Compressors/unloaders have ON and OFF delays	Compressors/unloaders have minimum ON and OFF times

Table A-1 *- Differences between RMCC and RMCT*

PIDA Control

The RMCT's PIDA control is similar in most respects to the RMCC's PID control (see **Section 3.1.*, PID Control***), except that a fourth mode, called the acceleration (or "A") mode, is working along with the proportional, integral, and derivative modes. The A mode is closely related to the derivative mode, which attempts to compensate for sudden changes in the control input. The acceleration mode watches the derivative mode and "speeds up" the system when necessary to help the derivative mode compensate quicker.

Variable-Speed Control

RMCT compressor groups operate much the same as RMCC compressor groups using Normal control (see **Section 3.2.1.1.**) and Normal variable-speed compressor control (see **Section 3.2.2.1.**). The Fixed steps strategy and Alternate variable-speed strategy may not be used in RMCT groups.

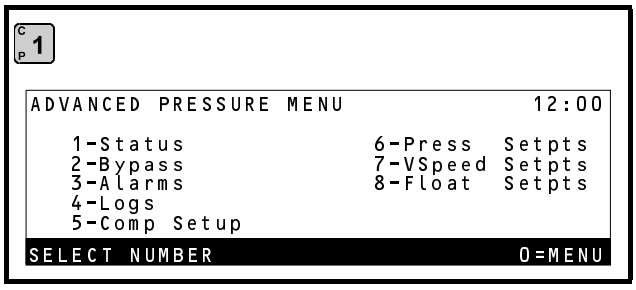
Like RMCC variable-speed compressors, RMCT variable speed compressors are always the first on and the last off in a group, and the RMCT only looks for new standard compressor combinations when the compressor is either at maximum (100%) or minimum speed. The major difference is in the way the RMCT selects compressor combinations and speeds.

The RMCT attempts to stabilize the suction pressure at the set point while keeping the variable-speed compressor operating within its middle range of speeds (around 55-90%). When the variable-speed is 100%, the RMCT will cycle on enough standard compressors to both fulfill the HP requirement and to allow the variable-speed compressor to lower its speed. By keeping the variable-speed in its middle range of speeds, it is in a better position to apply slight corrections to the PID output to compensate for small fluctuations in the suction pressure.

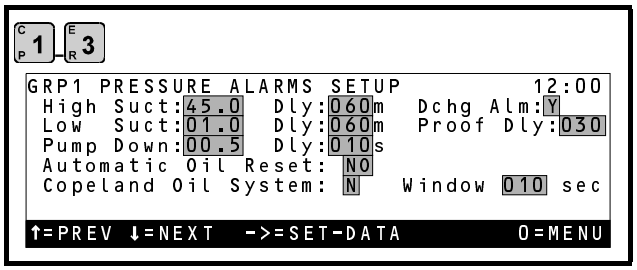
The RMCT also has a "dead band" feature that cycles off compressors when the suction pressure drops too low. This feature is described in detail in the System Navigation section below.

RMCT v2.10 System Navigation Screens (Advanced Pressure Menu)

The following pages contain all of the screens under the RMCT's Advanced Pressure Menu that are different from the RMCC Pressure Menu. Most of the descriptions of these screens will refer to the RMCC screens in Section 7 of this manual, with only a brief description of the differences between RMCT and RMCC. The RMCT screens that are identical to the RMCC screens will not be shown in this appendix.

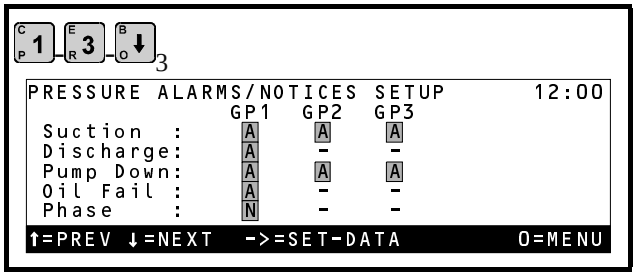


Grp 1-3 Pressure Alarms Setup


CP 1 - ER 3
GRP1 PRESSURE ALARMS SETUP 12:00
High Suct:45.0 Dly:060m Dchg Alm:Y
Low Suct:01.0 Dly:060m Proof Dly:030
Pump Down:00.5 Dly:010s
Automatic Oil Reset: NO
Copeland Oil System: N Window 010 sec
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

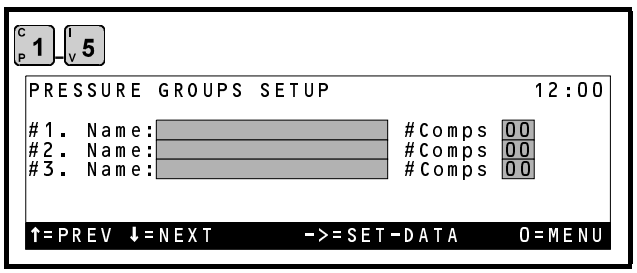
The Pressure Alarms Setup screens are identical to the RMCC screens shown in **Section 7.3.4.** However, since only three groups may be defined in the RMCT, there is no Group 4 setup screen.

Pressure Alarms/Notices Setup


CP 1 - ER 3 - BO ↓ 3
PRESSURE ALARMS/NOTICES SETUP 12:00
GP1 GP2 GP3
Suction : A A A
Discharge: A - -
Pump Down: A A A
Oil Fail : A - -
Phase : N - -
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

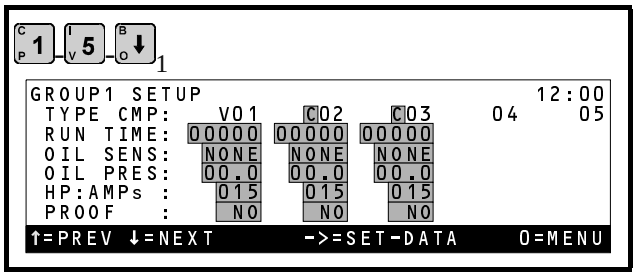
The Pressure Alarms/Notices Setup screen is nearly identical to the RMCC screen shown in **Section 7.3.5.**, except there is no GP4 column.

Pressure Groups Setup



The Pressure Groups Setup screen is similar to the Compressor Setup screen shown in **Section 7.3.9.** However, only three groups may be defined, and no more than ten compressors may be defined in a single group.

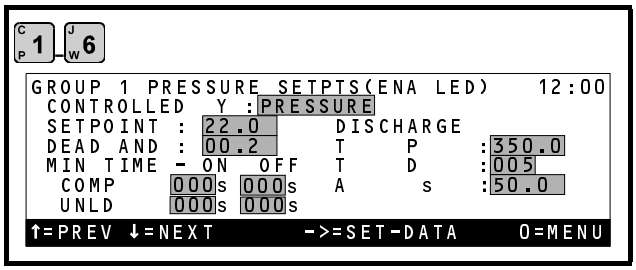
Groups 1-3 Setup


CP 1 - IV 5 - BO ↓ 1
GROUP1 SETUP 12:00
TYPE CMP: V01 C02 C03 04 05
RUN TIME: 00000 00000 00000
OIL SENS: NONE NONE NONE
OIL PRES: 00.0 00.0 00.0
HP:AMPs : 015 015 015
PROOF : NO NO NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

The Groups 1-3 Setup screens are similar to the RMCC Group Setup screens as shown in **Section 7.3.10.** However, the first compressor in the group is always (V)ariable-speed, and its type may not be altered.

Also, since there are only three suction groups, there is no Group 4 Setup screen.

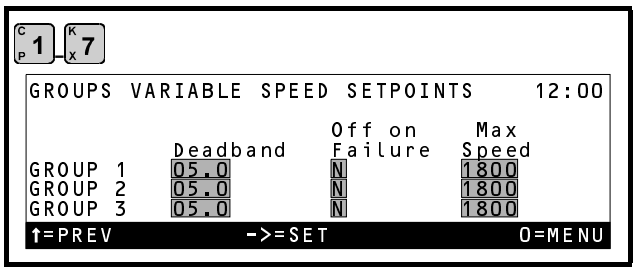
Group 1-3 Pressure Set Points


C P 1
J W 6
GROUP 1 PRESSURE SETPTS(ENA LED) 12:00
CONTROLLED Y :PRESSURE
SETPOINT : 22.0 DISCHARGE
DEAD AND : 00.2 T P :350.0
MIN TIME - ON OFF T D :005
COMP 000s 000s A s :50.0
UNLD 000s 000s
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU

This screen is similar to the RMCC Group 1 Pressure Setpoints screen shown in **Section 7.3.13.** However, the Strategy field is not present, since the RMCT uses only the Normal strategy.

Also, RMCT suction groups have no ON and OFF delays; instead, the RMCT uses minimum ON and OFF times. The Min Time Off and Min Time On fields are in the lower left corner of the screen **[0 - 240 sec] [0 sec].** All compressors and unloaders in the group must remain on for the Minimum Time On duration and must remain off for the Minimum Time Off duration.

Variable Speed Set Points


C P 1
K X 7
GROUPS VARIABLE SPEED SETPOINTS 12:00
Deadband Off on Failure Max Speed
GROUP 1 05.0 N 1800
GROUP 2 05.0 N 1800
GROUP 3 05.0 N 1800
↑=PREV ->=SET 0=MENU

Variable-speed compressors for RMCT suction groups are configured using this screen.

Deadband [0 - 99] [5.0]

The Deadband value is subtracted from a group's Suction Setpoint to determine the pressure below which all compressors will be shut off. For example, if the Suction Setpoint is 25 and the Deadband is 5.0, all compressors will shut off when the suction pressure goes below 20. Off delays will still be applied.

Off on Failure [Y or N] [N]

See the description of Off on Failure given in the RMCC Variable Speed Set Points screen on Section 7.3.14. Group 1 Variable Speed Set Points.

Max Speed [0 - 9999 rpm] [1800 rpm]

The maximum rpm of the variable-speed compressor must be entered in the Max Speed field.

Note that unlike the RMCC Variable Speed Set Points screen on Section 7.3.14. Group 1 Variable Speed Set Points, there is no Minimum Speed field. The RMCT automatically assumes that the minimum speed of the variable-speed compressor is 50% of the maximum speed; therefore, when the Max Speed is 1800 rpm, the minimum speed will be 900 rpm. Users may not alter the value of minimum speed.

Also, note that unlike the RMCC, there are no fields in which to insert maximum speed increase and decrease rates. In the RMCT, increase rates are determined by the inverters driving the compressors.

Appendix B: Sensor Hardware/Software Setup Table

How to Use This Table

Table B-1 lists all sensors commonly used in an RMCC setup by both name and part number. The table divides sensor setup for each sensor into five different steps, each of which is represented by a column in the table. The columns are as follows:

- ***Input Dip Switch*** - the position of the 16AI or 8IO dip switch rocker that corresponds to the input point to which the sensor will be connected. Refer to **Section 5.12.,** *Input Type Dip Switch Settings*.
- ***Voltage to Sensor*** - the voltage, if any, required to power the sensor.
- ***Type*** - the sensor type that must be selected when setting up the sensor in the sensor software. Sensor types are defined in **Section 7.6.2.,** ***Setup***.
- ***Typical Settings*** - This column contains typical alarm set points, sensor cut-on and cut-off set points, and alarm delay values for each sensor type. If the sensor type is linear, the Gain and Offset values are also included in this column.
- ***Wiring*** - wiring instructions and specifications.

P/N	Sensor	Input Dip Switch	Voltage to Sensor	Type	Typical Settings	Wiring
203-1902	Dew Point Probe	Down	24 VAC	(D)ewpt or (L)inear	If set up as linear, Gain = -58.4 Offset = -1523	Green to AC1 White to AC2 Black to odd number input (GND) Red to even number input (SIG)
	Temp Probe	Up	N/A	(T)emp		Two wires to input (polarity insensitive)
809-1070 809-1072	LDS to RMCC	Down	Supplied by LDS	(R)efrLk	Alarm at 250 ppm	Shielded wire and Common on LDS tied together to odd number on 16AI Analog Outputs to even numbers on 16AI
809-1100 809-1101 809-1105 809-1106	IRLDS to RMCC	Down	Supplied by IRLDS	(I)RLDS or (L)inear	If set up as linear, Gain=250 Offset=0 Alarm at 100 ppm	Output number on IRLDS to even number on 16AI Common on IRLDS to odd number on 16AI ***NOTE: Individual commons MUST be wired for each point.***
809-1100 809-1101 809-1105 809-1106	IRLDS to RMCC (all vs. below RMCC 2.10) for faults	Down	Supplied by IRLDS	(L)inear	Gain=1000 Offset=0 Alarm at 4960 mV	Output number on IRLDS to even number on 16AI Common on IRLDS to odd number on 16AI ***NOTE: Individual commons MUST be wired for each point.***
206-0002	Light Level	Down	12 VDC	(L)inear	Gain=175 Offset=0 On @ 20 Off @ 30	Black to +12V on 16AI (PWR) Green to odd no. on input (GND) Yellow and red to even no. on input (SIG)
207-0100	Analog Liquid Level	Down	12 VDC	L(q)Lvl	Alarm @ 15% with delay of 30 minutes	Red to +12V on 16AI (PWR) Black to odd no. on input (GND) Green to even no. on input (SIG)

Table B-1 *- RMCC sensor setup*

P/N	Sensor	Input Dip Switch	Voltage to Sensor	Type	Typical Settings	Wiring
207-1000	Refrigerant Level Transducer (Hansen Probe)	Down	12 VDC	(L)inear	Gain=20 Offset=0 Alarm @ 10% with delay of 30 minutes	Red to +12V on 16AI (PWR) Black to odd no. on input (GND) Green to even no. on input (SIG)
508-2000	Checkit	Down	24 VDC	N/A	Alarm @ 150 with delay of 30 minutes	Two blk. wires to AC1 and AC2 Two gray wires to input (polarity insensitive)
809-1550	Refrigerant Xducer	Down	12 VDC	Linear	Gain=200 Offset=0 Alarm @ 250 ppm	Red to +12V on 16AI (PWR) Black and Green to odd no. on input (GND) White to even no. on input (SIG) ***NOTE: A 16AI board may only power one Refrigerant Transducer. Multiple transducers may be on one 16AI if external power source is used.***
800-1100 800-1200 800-1500	Pressure Transducers (Eclipse)	Down	5 VDC	(1)00, (2)00, or (5)00	Alarm at 20 lbs above setpoint with 60 min delay	Red to +5V on 16AI (PWR) Black and Shield to odd no. on input (GND) White to even number on input (SIG) ***NOTE: Transducer type must be set to* ECLIPSE *under Transducer Setup.***
203-5750	Relative Humidity	Down	12 VDC	(H)um		Red to +12V on 16AI (PWR) Black to odd number on input (GND) White to even number on input (SIG) marked “out” on sensor Jumper N to G at sensor

Table B-1 *- RMCC sensor setup*

Appendix C: Pressure/Voltage and Temperature/Resistance Charts for Eclipse Transducers & CPC Temp Sensors

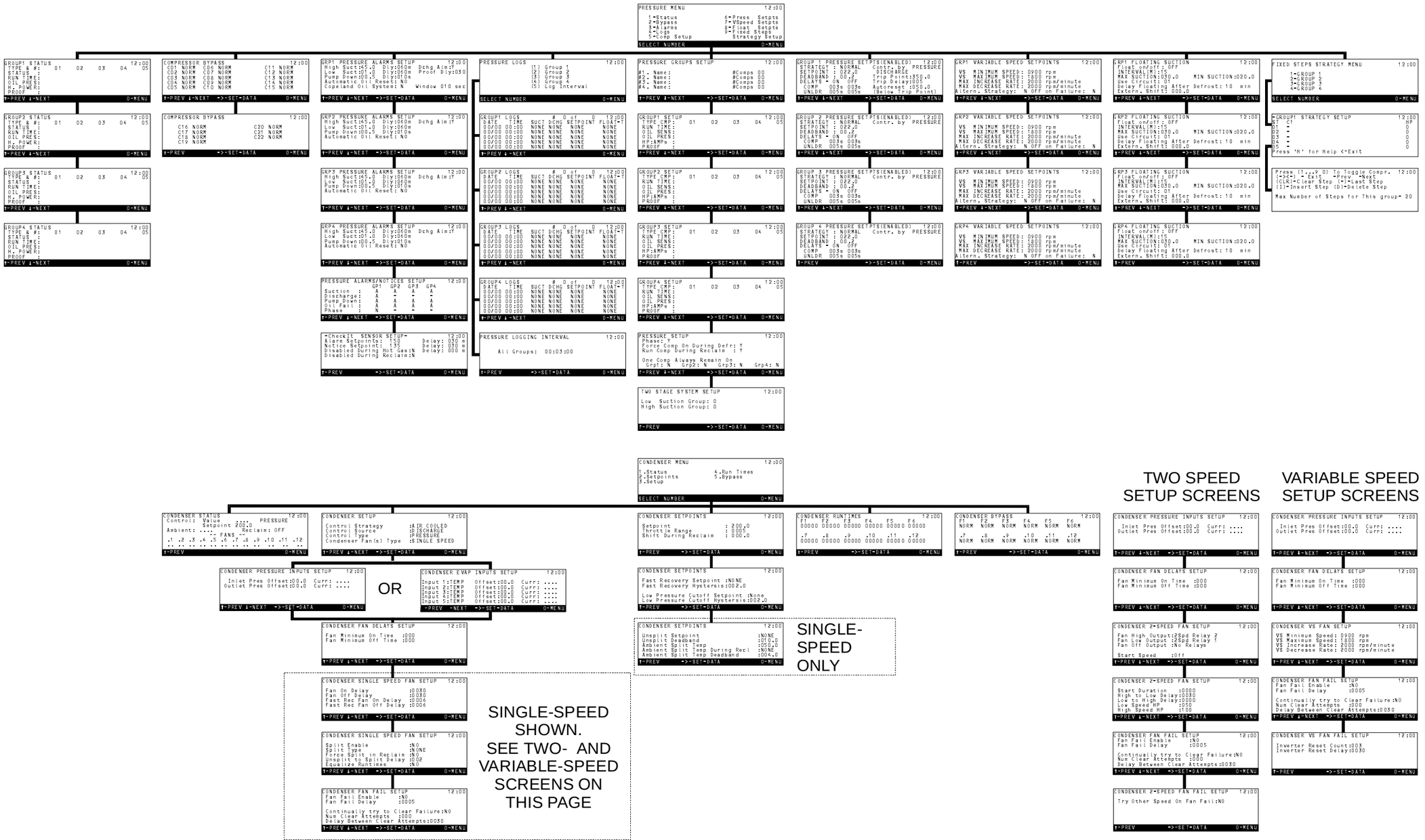
CPC Temperature Sensors	
Resistance (ohms)	**Temperature (F)**
336,450	-40
234,170	-30
165,210	-20
118,060	-10
85,399	0
62,493	10
46,235	20
34,565	30
26,100	40
19,899	50
15,311	60
11,883	70
9,299	80
7,334	90

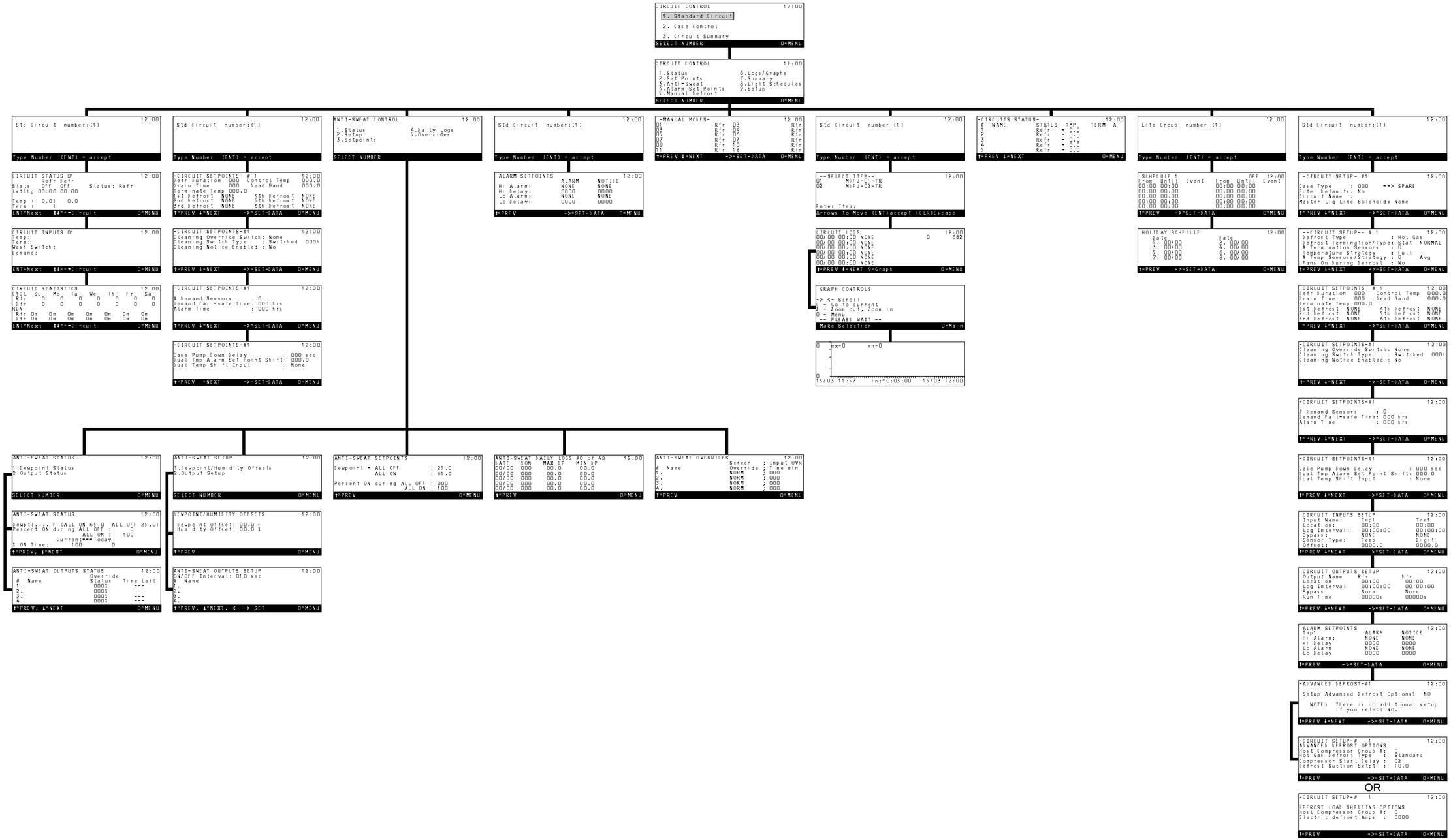
Table 15-1 *- Temp Sensor Temperature/Resistance Chart*

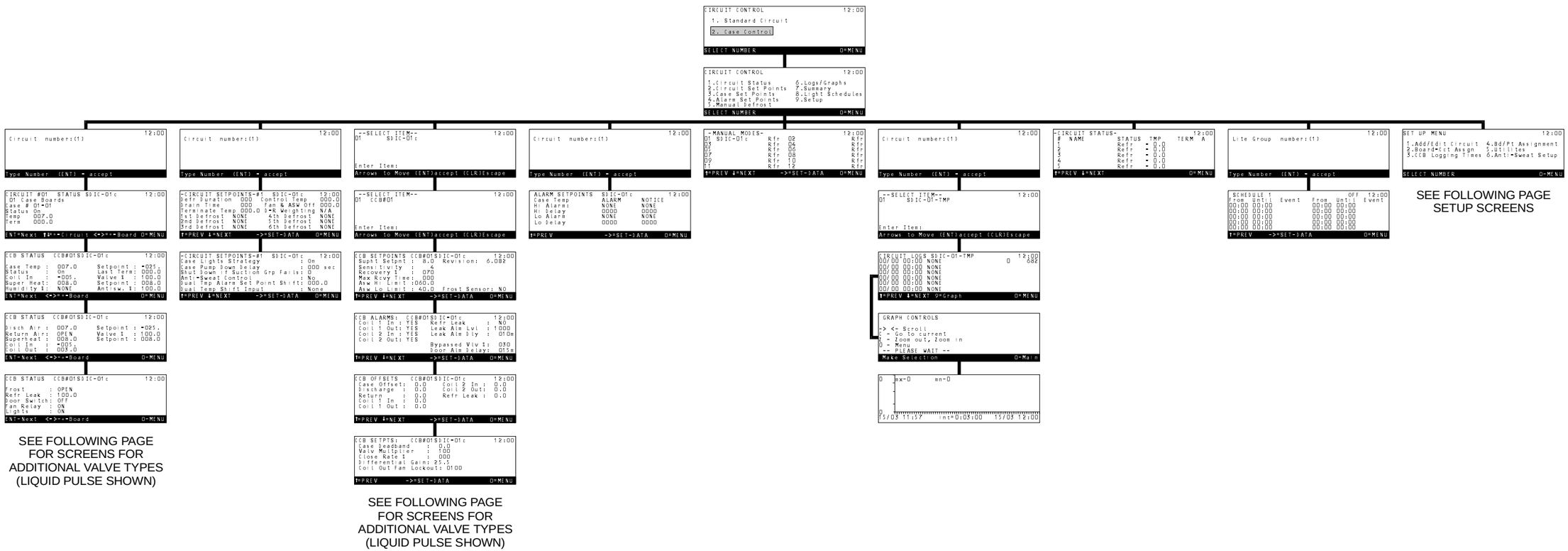
Eclipse Transducers			
Voltage (VDC)	**Pressure (PSI)**		
	100 lb. xducer	**200 lb. xducer**	**500 lb. xducer**
0.5	0	0	0
0.7	5	10	25
0.9	10	20	50
1.1	15	30	75
1.3	20	40	100
1.5	25	50	125
1.7	30	60	150
1.9	35	70	175
2.1	40	80	200
2.3	45	90	225
2.5	50	100	250
2.7	55	110	275
2.9	60	120	300
3.1	65	130	325
3.3	70	140	350
3.5	75	150	375
3.7	80	160	400
3.9	85	170	425
4.1	90	180	450
4.3	95	190	475
4.5	100	200	500

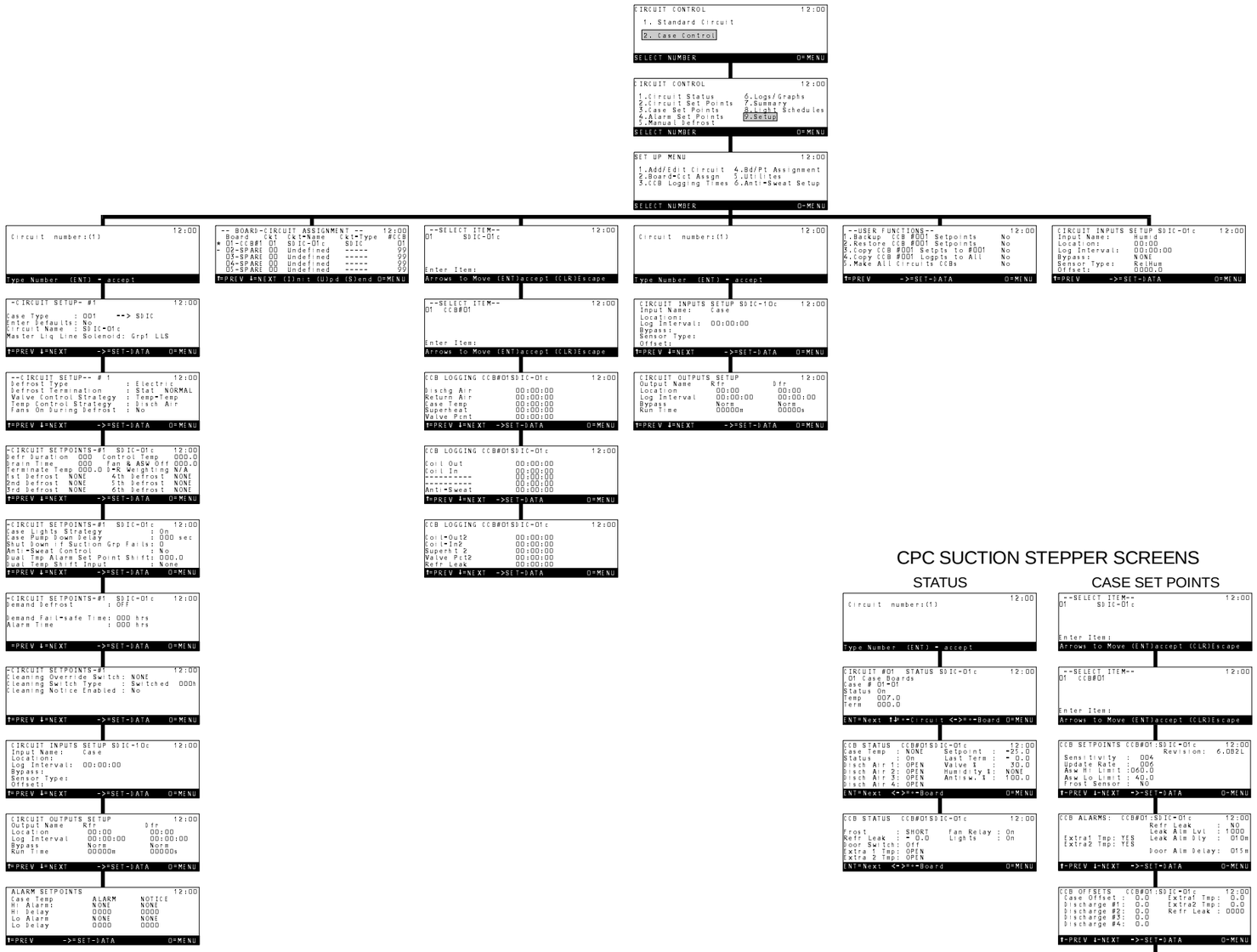
Table 15-2 *- Eclipse Voltage to Pressure Chart*

Appendix D: System Navigation Screens



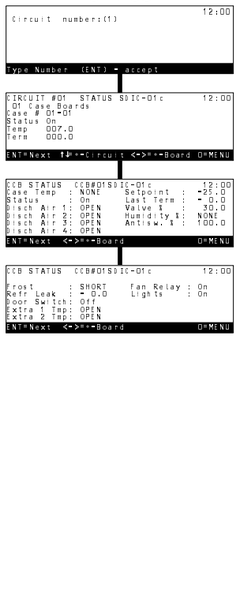

CIRCUIT CONTROL 12:00
1. Standard Circuit
2. Case Control
3. Circuit Summary
SELECT NUMBER 0=MENU
CIRCUIT CONTROL 12:00
1.Status 6.Logs/Graphs
2.Set Points 7.Summary
3.Anti-Sweat 8.Light Schedules
4.Alarm Set Points 9.Setup
5.Manual Defrost
SELECT NUMBER 0=MENU
Std Circuit number:(1)
Type Number (ENT) - accept
CIRCUIT STATUS 01
Defr Defr
Stats Off Off Status: Refr
LstChg 00:00 00:00
Temp (0.0) 0.0
Term ( )
ENT=Next ↑↓=-=Circuit 0=MENU
CIRCUIT INPUTS 01
Temp:
Term:
Wash Switch:
Demand:
ENT=Next ↑↓=-=Circuit 0=MENU
CIRCUIT STATISTICS
CYCL Su Mo Tu We Th Fr Sa
Rfr 0 0 0 0 0 0 0
Dfr 0 0 0 0 0 0 0
RUN
Rfr On On On On On On On
Dfr On On On On On On On
ENT=Next ↑↓=-=Circuit 0=MENU
-CIRCUIT SETPOINTS- # 1
Defr Duration 000 Control Temp 000.0
Drain Time 000 Dead Band 000.0
Terminate Temp 000.0
1st Defrost NONE 4th Defrost NONE
2nd Defrost NONE 5th Defrost NONE
3rd Defrost NONE 6th Defrost NONE
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS-#1
Cleaning Override Switch: None
Cleaning Switch Type : Switched 000h
Cleaning Notice Enabled : No
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS-#1
Demand Sensors : 0
Demand Fail-safe Time: 000 hrs
Alarm Time : 000 hrs
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS-#1
Case Pump Down Delay : 000 sec
Dual Tmp Alarm Set Point Shift: 000.0
Dual Temp Shift Input : None
↑=PREV =NEXT ->=SET-DATA 0=MENU
ANTI-SWEAT CONTROL
1.Status 4.Daily Logs
2.Setup 5.Overrides
3.Setpoints
SELECT NUMBER
Std Circuit numbers:(1)
Type Number (ENT) - accept
ALARM SETPOINTS
ALARM NOTICE
Hi Alarm: NONE NONE
Hi Delay: 0000 0000
Lo Alarm: NONE NONE
Lo Delay: 0000 0000
↑=PREV ->=SET-DATA 0=MENU
-MANUAL MODES-
01 Rfr 02 Rfr
03 Rfr 04 Rfr
05 Rfr 06 Rfr
07 Rfr 08 Rfr
09 Rfr 10 Rfr
11 Rfr 12 Rfr
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
Std Circuit number:(1)
Type Number (ENT) - accept
--SELECT ITEM--
01 MRJ-01-TR
02 MRJ-02-TR
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
CIRCUIT LOGS
00/00 00:00 NONE 0 682
00/00 00:00 NONE
00/00 00:00 NONE
00/00 00:00 NONE
00/00 00:00 NONE
00/00 00:00 NONE
↑=PREV ↓=NEXT 9=Graph 0=MENU
GRAPH CONTROLS
-> <- Scroll
+ - Go to current
% - Zoom out, Zoom in
0 - Menu
-- PLEASE WAIT --
Make Selection 0=Main
0 mx=0 mn=0
0
15/03 11:57 int=0:03:00 15/03 12:00
-CIRCUITS STATUS-
NAME STATUS TMP TERM A
1 Refr - 0.0
2 Refr - 0.0
3 Refr - 0.0
4 Refr - 0.0
5 Refr - 0.0
↑=PREV ↓=NEXT 0=MENU
Lite Group number:(1)
Type Number (ENT) - accept
SCHEDULE 1 OFF
From Until Event From Until Event
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
↑=PREV ->=SET-DATA 0=MENU
HOLIDAY SCHEDULE
Date Date
1. 00/00 2. 00/00
3. 00/00 4. 00/00
5. 00/00 6. 00/00
7. 00/00 8. 00/00
↑=PREV ->=SET-DATA 0=MENU
Std Circuit number:(1)
Type Number (ENT) - accept
-CIRCUIT SETUP- #1
Case Type : 000 --> SPARE
Enter Defaults: No
Circuit Name :
Master Liq Line Solenoid: None
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
---CIRCUIT SETUP-- # 1
Defrost Type : Hot Gas
Defrost Termination/Type: Stat NORMAL
Termination Sensors : 0
Temperature Strategy : Full
Temp Sensors/Strategy : 0 Avg
Fans On During Defrost : No
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS- #
Defr Duration 000 Control Temp 000.0
Drain Time 000 Dead Band 000.0
Terminate Temp 000.0
1st Defrost NONE 4th Defrost NONE
2nd Defrost NONE 5th Defrost NONE
3rd Defrost NONE 6th Defrost NONE
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS-#1
Cleaning Override Switch: None
Cleaning Switch Type : Switched 000h
Cleaning Notice Enabled : No
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS-#1
Demand Sensors : 0
Demand Fail-safe Time: 000 hrs
Alarm Time : 000 hrs
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETPOINTS-#1
Case Pump Down Delay : 000 sec
Dual Tmp Alarm Set Point Shift: 000.0
Dual Temp Shift Input : None
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CIRCUIT INPUTS SETUP
Input Name: Tmp1 Tmp2
Location: 00:00 00:00
Log Interval: 00:00:00 00:00:00
Bypass: NONE NONE
Sensor Type: Temp Digit
Offset: 0000.0 0000.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CIRCUIT OUTPUTS SETUP
Output Name Rfr Dfr
Location 00:00 00:00
Log Interval 00:00:00 00:00:00
Bypass Norm Norm
Run Time 00000s 00000s
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
ALARM SETPOINTS
Tmp1 ALARM NOTICE
Hi Alarm: NONE NONE
Hi Delay 0000 0000
Lo Alarm NONE NONE
Lo Delay 0000 0000
↑=PREV ->=SET-DATA 0=MENU
-ADVANCED DEFROST-#1
Setup Advanced Defrost Options? NO
NOTE: There is no additional setup if you select NO.
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-CIRCUIT SETUP-# 1
ADVANCED DEFROST OPTIONS
Hot Compressor Group #: 0
Hot Gas Defrost Type : Standard
Compressor Start Delay : 02
Defrost Suction Setpt : 10.0
↑=PREV ->=SET-DATA 0=MENU
OR
-CIRCUIT SETUP-# 1
DEFROST LOAD SHEDDING OPTIONS
Host Compressor Group #: 0
Electric defrost Amps : 0000
↑=PREV ->=SET-DATA 0=MENU
ANTI-SWEAT STATUS
1.Dewpoint Status
2.Output Status
SELECT NUMBER 0=MENU
ANTI-SWEAT STATUS
Dewpt: -.- F (ALL ON 65.0 ALL Off 25.0)
Percent ON during ALL OFF : 0
ALL ON : 100
Current---Today---
% ON Time: 100 0
↑=PREV, ↓=NEXT 0=MENU
ANTI-SWEAT OUTPUTS STATUS
Override
Name Status Time Left
1. 0001 ---
2. 0001 ---
3. 0001 ---
4. 0001 ---
↑=PREV, ↓=NEXT 0=MENU
ANTI-SWEAT SETUP
1.Dewpoint/Humidity Offsets
2.Output Setup
SELECT NUMBER 0=MENU
DEWPOINT/HUMIDITY OFFSETS
Dewpoint Offset: 00.0 F
Humidity Offset: 00.0 %
↑=PREV 0=MENU
ANTI-SWEAT OUTPUTS SETUP
ON/Off Interval: 010 sec
Name
1.
2.
3.
4.
↑=PREV, ↓=NEXT, <- -> SET 0=MENU
ANTI-SWEAT SETPOINTS
Dewpoint - ALL Off : 25.0
ALL ON : 65.0
Percent ON during ALL Off : 000
ALL ON : 100
↑=PREV 0=MENU
ANTI-SWEAT DAILY LOGS #0 of 48
DATE ION MAX DP MIN DP
00/00 000 00.0 00.0
00/00 000 00.0 00.0
00/00 000 00.0 00.0
00/00 000 00.0 00.0
00/00 000 00.0 00.0
↑=PREV 0=MENU
ANTI-SWEAT OVERRIDES
Screen ; Input OVR
Name Override ; Time min
1. NORM ; 000
2. NORM ; 000
3. NORM ; 000
4. NORM ; 000
↑=PREV 0=MENU


CIRCUIT CONTROL 12:00
1. Standard Circuit
2. Case Control
SELECT NUMBER O=MENU
CIRCUIT CONTROL 12:00
1.Circuit Status 6.Logs/Graphs
2.Circuit Set Points 7.Summary
3.Case Set Points 8.Light Schedules
4.Alarm Set Points 9.Setup
5.Manual Defrost
SELECT NUMBER O=MENU
Circuit number:(1) 12:00
Type Number (ENT) - accept
CIRCUIT #01 STATUS SDIC-01c 12:00
01 Case Boards
Case # 01-01
Status On
Temp 007.0
Term 000.0
ENT=Next ↑↓=-Circuit <->=--Board O=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Case Temp : 007.0 Setpoint : -025.
Status : On Last Term: 000.0
Coil In : -005. Valve % : 100.0
Superheat: 008.0 Setpoint : 008.0
Humidity %: NONE Anti-sw. %: 100.0
ENT=Next <->=--Board O=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Disch Air : 007.0 Setpoint : -025.
Return Air: OPEN Valve % : 100.0
Superheat : 008.0 Setpoint : 008.0
Coil In : -005.
Coil Out : 003.0
ENT=Next <->=--Board O=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Frost : OPEN
Refr Leak : 100.0
Door Switch: OFF
Fan Relay : ON
Lights : ON
ENT=Next <->=--Board O=MENU
SEE FOLLOWING PAGE
FOR SCREENS FOR
ADDITIONAL VALVE TYPES
(LIQUID PULSE SHOWN)
Circuit number:(1) 12:00
Type Number (ENT) - accept
-CIRCUIT SETPOINTS-#1 SDIC-01c 12:00
Defr Duration 000 Control Temp 000.0
Drain Time 000 Fan & ASW Off 000.0
Terminate Temp 000.0 P-R Weighting N/A
1st Defrost NONE 4th Defrost NONE
2nd Defrost NONE 5th Defrost NONE
3rd Defrost NONE 6th Defrost NONE
↑=PREV ↓=NEXT ->=SET-DATA O=MENU
-CIRCUIT SETPOINTS-#1 SDIC-01c 12:00
Case Lights Strategy : On
Case Pump Down Delay : 000 sec
Shut Down if Suction Grp Fails: O
Anti-Sweat Control : No
Dual Tmp Alarm Set Point Shift: 000.0
Dual Temp Shift Input : None
↑=PREV ↓=NEXT ->=SET-DATA O=MENU
--SELECT ITEM-- 12:00
01 SDIC-01c
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 CCB#01
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
CCB SETPOINTS CCB#01SDIC-01c 12:00
Supht Setpnt : 8.0 Revision: 6.082
Sensitivity : 4
Recovery % : 070
Max Recvy Time: 000
Asw Hi Limit :060.0
Asw Lo Limit : 40.0 Frost Sensor: NO
↑=PREV ↓=NEXT ->=SET-DATA O=MENU
CCB ALARMS: CCB#01SDIC-01c 12:00
Coil 1 In: YES Refr Leak : NO
Coil 1 Out: YES Leak Alm Lvl : 1000
Coil 2 In : YES Leak Alm Dly : 0100
Coil 2 Out: YES
Bypassed Vlv %: 030
Door Alm Delay: 015m
↑=PREV ↓=NEXT ->=SET-DATA O=MENU
CCB OFFSETS CCB#01SDIC-01c 12:00
Case Offset: 0.0 Coil 2 In : 0.0
Discharge : 0.0 Coil 2 Out: 0.0
Return : 0.0 Refr Leak : 0.0
Coil 1 In : 0.0
Coil 1 Out : 0.0
↑=PREV ↓=NEXT ->=SET-DATA O=MENU
CCB SETPTS: CCB#01SDIC-01c 12:00
Case Deadband : 0.0
Valv Multiplier : 100
Close Rate % : 000
Differential Gain: 25.5
Coil Out Fan Lockout: 0100
↑=PREV ->=SET-DATA O=MENU
SEE FOLLOWING PAGE
FOR SCREENS FOR
ADDITIONAL VALVE TYPES
(LIQUID PULSE SHOWN)
Circuit numbers:(1) 12:00
Type Number (ENT) - accept
ALARM SETPOINTS SDIC-01c 12:00
Case Temp ALARM NOTICE
Hi Alarm: NONE NONE
Hi Delay 0000 0000
Lo Alarm NONE NONE
Lo Delay 0000 0000
↑=PREV ->=SET-DATA O=MENU
-MANUAL MODES- 12:00
01 SDIC-01c
Rfr 02 Rfr
03 Rfr 04 Rfr
05 Rfr 06 Rfr
07 Rfr 08 Rfr
09 Rfr 10 Rfr
11 Rfr 12 Rfr
↑=PREV ↓=NEXT ->=SET-DATA O=MENU
Circuit number:(1) 12:00
Type Number (ENT) - accept
--SELECT ITEM-- 12:00
01 SDIC-01-TMP
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
CIRCUIT LOGS SDIC-01-TMP 12:00
00/00 00:00 NONE 0 682
00/00 00:00 NONE
00/00 00:00 NONE
00/00 00:00 NONE
00/00 00:00 NONE
00/00 00:00 NONE
↑=PREV ↓=NEXT G=Graph O=MENU
GRAPH CONTROLS
-> <- Scroll
. - Go to current
+ - Zoom out, Zoom in
0 - Menu
-- PLEASE WAIT --
Make Selection O=Main
0 mx-0 mn-0
0
15/03 11:57 int=0:03:00 15/03 12:00
-CIRCUIT STATUS- 12:00
NAME STATUS TMP TERM A
1 Refr - 0.0
2 Refr - 0.0
3 Refr - 0.0
4 Refr - 0.0
5 Refr - 0.0
↑=PREV ↓=NEXT O=MENU
Lite Group number:(1) 12:00
Type Number (ENT) - accept
SCHEDULE 1 OFF 12:00
From Until Event From Until Event
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
00:00 00:00 00:00 00:00
↑=PREV ->=SET-DATA O=MENU
SET UP MENU 12:00
1.Add/Edit Circuit 4.Bd/Pt Assignment
2.Board-Cct Assgn 5.Utilities
3.CCB Logging Times 6.Anti-Sweat Setup
SELECT NUMBER O=MENU
SEE FOLLOWING PAGE
SETUP SCREENS

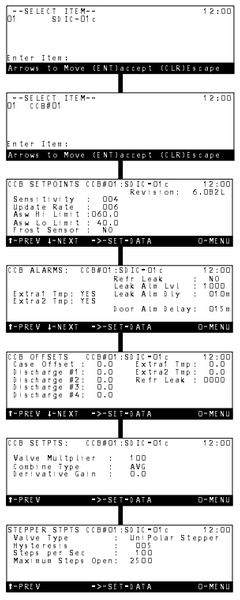


CPC SUCTION STEPPER SCREENS

STATUS

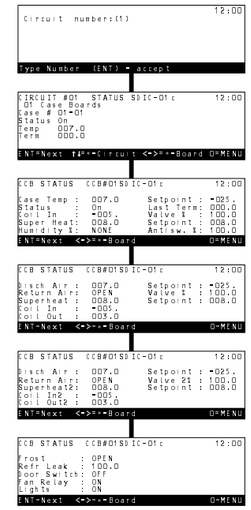

Circuit number:(1)
Type Number (ENT) = accept
CIRCUIT #01 STATUS SDIC-01c 12:00
01 Case Boards
Case # 01-01
Status On
Temp 007.0
Term 000.0
ENT=Next ↑↓=Circuit <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Case Temp : NONE Setpoint : -25.0
Status : On Last Term : - 0.0
Disch Air 1: OPEN Valve 1 : 30.0
Disch Air 2: OPEN Asw Hi Limit :060.0
Disch Air 3: OPEN Antisw.1 : 100.0
Disch Air 4: OPEN
ENT=Next <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Frost : SHORT fan Relay : On
Refr Leak : - 0.0 Lights : On
Door Switch: Off
Extra 1 Tmp: OPEN
Extra 2 Tmp: OPEN
ENT=Next <->=Board 0=MENU

CASE SET POINTS

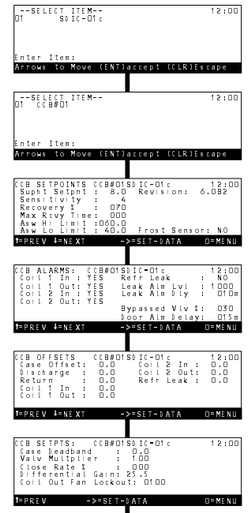

--SELECT ITEM-- 12:00
01 SDIC-01c
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 CCB#01
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
CCB SETPOINTS CCB#01:SDIC-01c 12:00
Sensitivity : 004 Revision: 6.08ZL
Update Rate : 006
Asw Hi Limit :060.0
Asw Lo Limit : 40.0
Frost Sensor : NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB ALARMS: CCB#01:SDIC-01c 12:00
Refr Leak : NO
Extra1 Tmp: YES Leak Alm Lvl : 1000
Extra2 Tmp: YES Leak Alm Dly : 01Om
Door Alm Delay: 015m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB OFFSETS CCB#01:SDIC-01c 12:00
Case Offset : 0.0 Extra1 Tmp: 0.0
Discharge #1: 0.0 Extra2 Tmp: 0.0
Discharge #2: 0.0 Refr Leak : 0000
Discharge #3: 0.0
Discharge #4: 0.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB SETPTS: CCB#01:SDIC-01c 12:00
Valve Multiplier : 100
Combine Type : AVG
Derivative Gain : 0.0
↑=PREV ->=SET-DATA 0=MENU
STEPPER STPTS CCB#01:SDIC-01c 12:00
Valve Type : UniPolar Stepper
Hysteresis : 005
Steps per Sec : 100
Maximum Steps Open: 2500
↑=PREV ->=SET-DATA 0=MENU

LIQUID STEPPER SCREENS

STATUS


Circuit number:(1)
Type Number (ENT) = accept
CIRCUIT #01 STATUS SDIC-01c 12:00
01 Case Boards
Case # 01-01
Status On
Temp 007.0
Term 000.0
ENT=Next ↑↓=Circuit <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Case Temp : 007.0 Setpoint : -025.
Status : On Last Term: 000.0
Coil In : -005. Valve 1 : 100.0
Super Heat: 008.0 Setpoint : 008.0
Humidity 1: NONE Antisw. 1: 100.0
ENT=Next <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Disch Air : 007.0 Setpoint : -025.
Return Air: OPEN Valve 1 : 100.0
Superheat : 008.0 Setpoint : 008.0
Coil In : -005.
Coil Out : 003.0
ENT=Next <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Disch Air : 007.0 Setpoint : -025.
Return Air: OPEN Valve 1 : 100.0
Superheat2: 008.0 Setpoint : 008.0
Coil In2 : -005.
Coil Out2 : 003.0
ENT=Next <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Frost : OPEN
Refr Leak : 100.0
Door Switch: OFF
Fan Relay : ON
Lights : ON
ENT=Next <->=Board 0=MENU

CASE SET POINTS

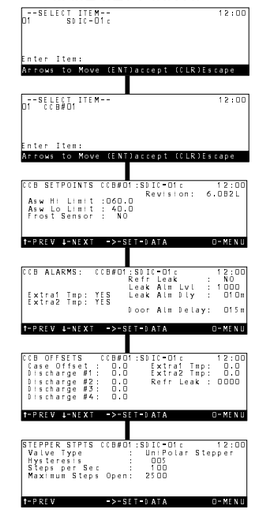

--SELECT ITEM-- 12:00
01 SDIC-01c
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 CCB#01
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
CCB SETPOINTS CCB#01:SDIC-01c 12:00
Supht Setpnt : 8.0 Revision: 6.08Z
Sensitivity : 4
Recovery T : 070
Max Rcvy Time: 000
Asw Hi Limit :060.0
Asw Lo Limit : 40.0
Frost Sensor: NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB ALARMS: CCB#01:SDIC-01c 12:00
Coil 1 In : YES Refr Leak : NO
Coil 1 Out: YES Leak Alm Lvl : 1000
Coil 2 In: YES Leak Alm Dly : 0Tom
Coil 2 Out: YES
Bypassed Vlv T: 030
Door Alm Delay: 015m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB OFFSETS CCB#01:SDIC-01c 12:00
Case Offset: 0.0 Coil 2 In : 0.0
Discharge : 0.0 Coil 2 Out: 0.0
Return : 0.0 Refr Leak : 0.0
Coil 1 In : 0.0
Coil 1 Out : 0.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB SETPTS: CCB#01:SDIC-01c 12:00
Case Deadband : 0.0
Valv Multiplier : 100
Close Rate 1 : 000
Differential Gain: 25.5
Coil Out Fan Lockout: 0100
↑=PREV ->=SET-DATA 0=MENU
STEPPER STPTS CCB#01:SDIC-01c 12:00
Valve Type : UniPolar Stepper
Hysteresis : 005
Steps per Sec : 100
Maximum Steps Open: 2500
↑=PREV ->=SET-DATA 0=MENU

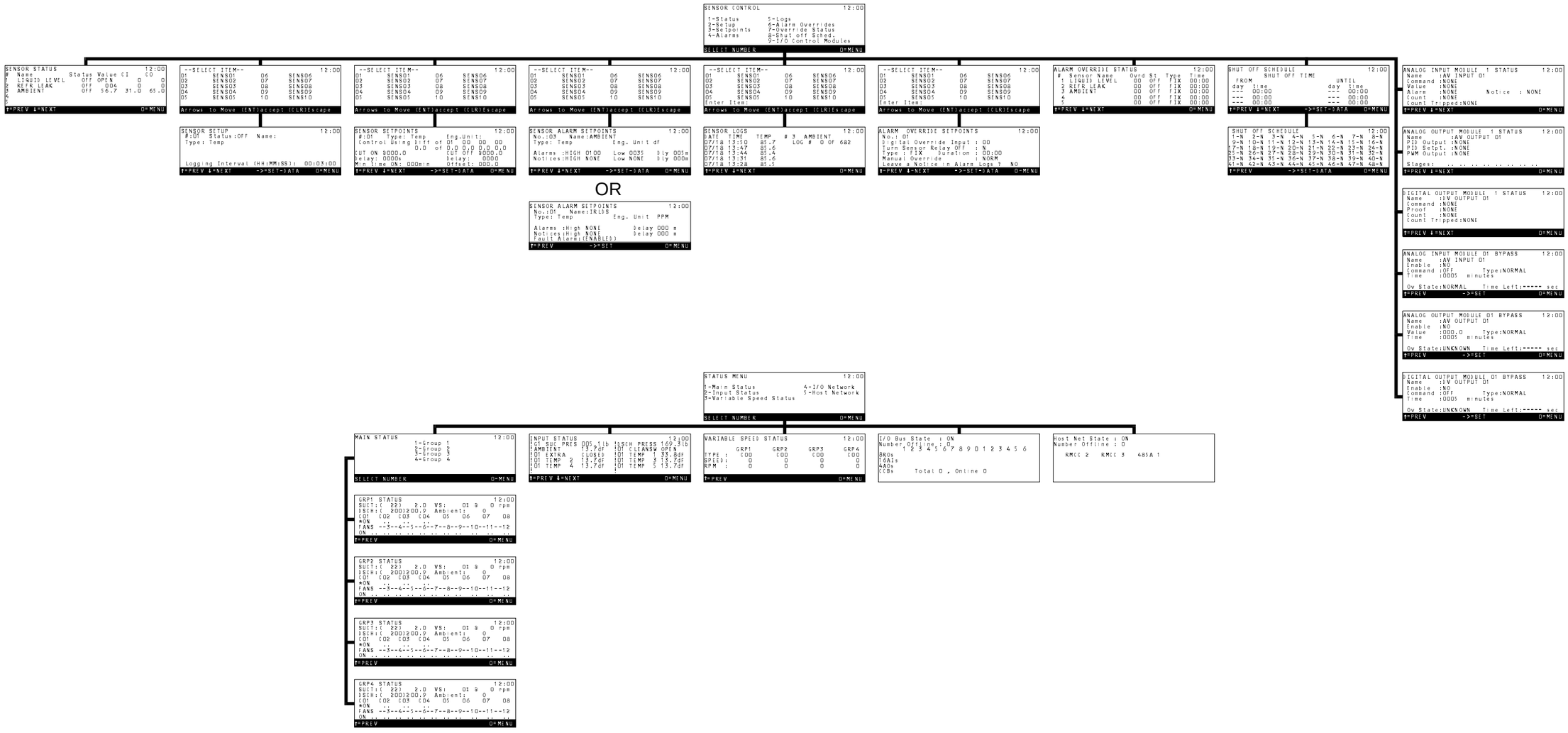
HUSSMANN SUCTION STEPPER SCREENS

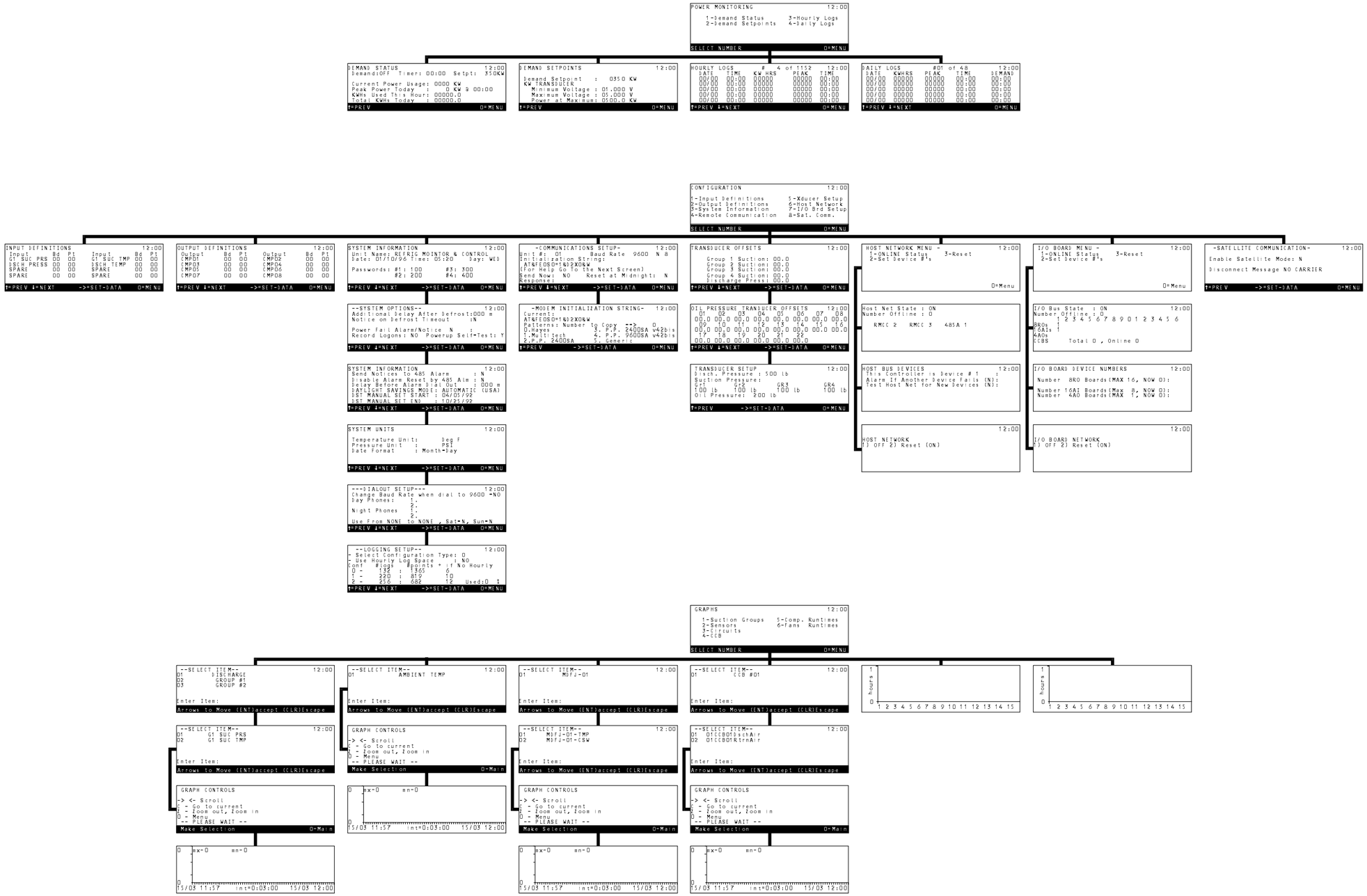
STATUS

Circuit number:(1)
Type Number (ENT) = accept
CIRCUIT #01 STATUS SDIC-01c 12:00
01 Case Boards
Case # 01-01
Status On
Temp 007.0
Term 000.0
ENT=Next ↑↓=Circuit <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Case Temp : NONE Setpoint : -25.0
Status : On Last Term : - 0.0
Disch Air 1: OPEN Valve 1 : 30.0
Disch Air 2: OPEN Humidity 1: NONE
Disch Air 3: OPEN Antisw.1 : 100.0
Disch Air 4: OPEN
ENT=Next <->=Board 0=MENU
CCB STATUS CCB#01SDIC-01c 12:00
Frost : SHORT fan Relay : On
Refr Leak : - 0.0 Lights : On
Door Switch: Off
Extra 1 Tmp: OPEN
Extra 2 Tmp: OPEN
ENT=Next <->=Board 0=MENU

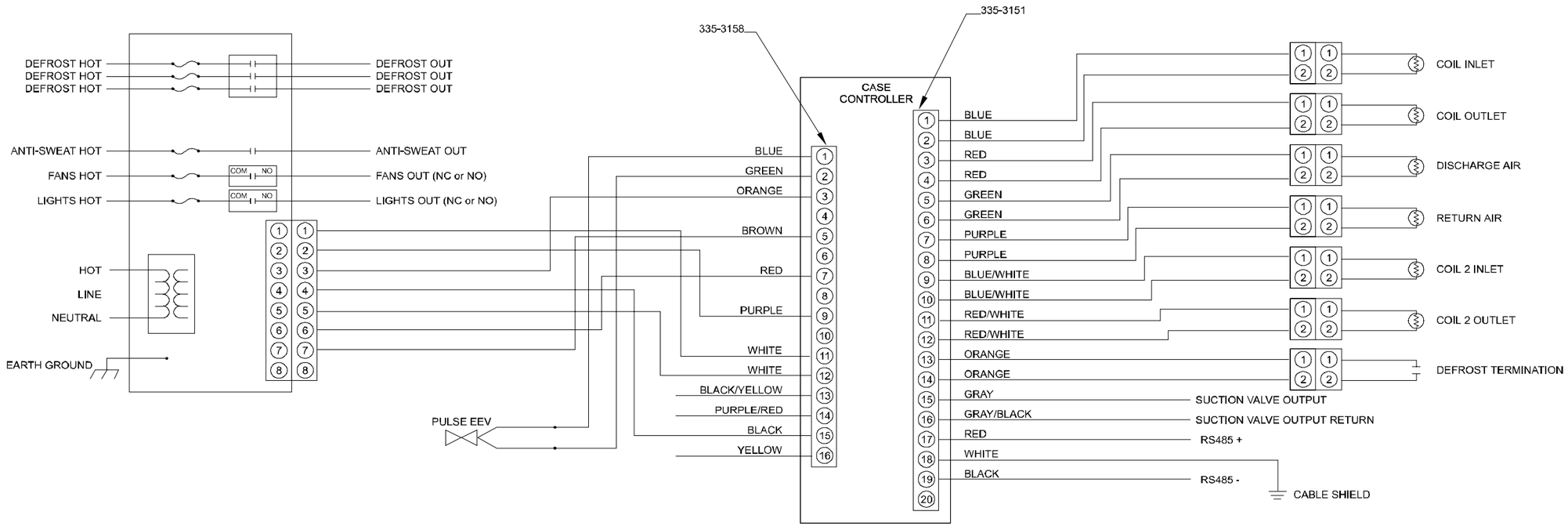
CASE SET POINTS


--SELECT ITEM-- 12:00
01 SDIC-01c
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 CCB#01
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
CCB SETPOINTS CCB#01:SDIC-01c 12:00
Revision: 6.08ZL
Asw Hi Limit :060.0
Asw Lo Limit : 40.0
Frost Sensor : NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB ALARMS: CCB#01:SDIC-01c 12:00
Refr Leak : NO
Extra1 Tmp: YES Leak Alm Lvl : 1000
Extra2 Tmp: YES Leak Alm Dly : 01Om
Door Alm Delay: 015m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
CCB OFFSETS CCB#01:SDIC-01c 12:00
Case Offset : 0.0 Extra1 Tmp: 0.0
Discharge #1: 0.0 Extra2 Tmp: 0.0
Discharge #2: 0.0 Refr Leak : 0000
Discharge #3: 0.0
Discharge #4: 0.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
STEPPER STPTS CCB#01:SDIC-01c 12:00
Valve Type : UniPolar Stepper
Hysteresis : 005
Steps per Sec : 100
Maximum Steps Open: 2500
↑=PREV ->=SET-DATA 0=MENU

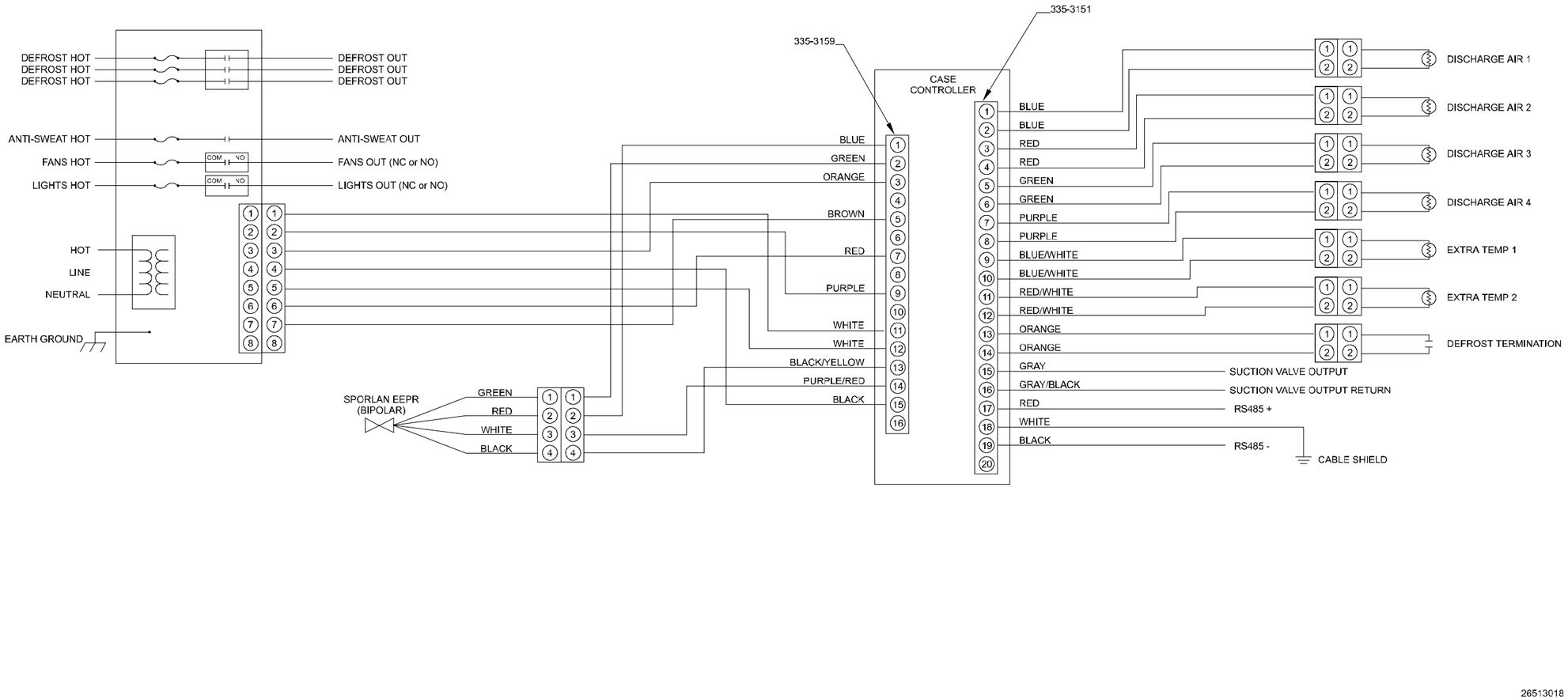

SENSOR CONTROL 12:00
1-Status 5-Logs
2-Setup 6-Alarm Overrides
3-Setpoints 7-Override Status
4-Alarms 8-Shut off Sched.
9-I/O Control Modules
SELECT NUMBER 0=MENU
SENSOR STATUS 12:00
Name Status Value CI SO
1 LIQUID LEVEL OFF OPEN 0 0
2 REFR LEAK OFF 004 0 0
3 AMBIENT OFF 56.7 31.0 65.0
4
5
↑=PREV ↓=NEXT 0=MENU
--SELECT ITEM-- 12:00
01 SENS01 06 SENS06
02 SENS02 07 SENS07
03 SENS03 08 SENS08
04 SENS04 09 SENS09
05 SENS05 10 SENS10
Arrows to Move (ENT)accept (CLR)Escape
SENSOR SETUP 12:00
#:01 Status:OFF Name:
Type: Temp
Logging Interval (HH:MM:SS): 00:03:00
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
SENSOR SETPOINTS 12:00
#:01 Type: Temp Eng.Units:
Control Using Diff of 01 00 00 00
0.0 of 0.0 0.0 0.0 0.0
CUT ON 9000.0 CUT OFF 9000.0
Delay: 0000s Delay: 0000
Min Time ON: 000min Offset: 000.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
SENSOR ALARM SETPOINTS 12:00
No.:03 Name:AMBIENT
Type: Temp Eng. Unit df
Alarms :HIGH 0100 Low 0035 Dly 005m
Notices:HIGH NONE Low NONE Dly 000m
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
OR
SENSOR ALARM SETPOINTS 12:00
No.:01 Name:IRLDS
Type: Temp Eng. Unit PPM
Alarms :High NONE Delay 000 m
Notices:High NONE Delay 000 m
Fault Alarm:(ENABLED)
↑=PREV ->=SET 0=MENU
SENSOR LOGS 12:00
DATE TIME TEMP # 3 AMBIENT
07/18 13:50 85.7 LOG # 0 Of 682
07/18 13:47 85.6
07/18 13:44 85.4
07/18 13:31 85.6
07/18 13:28 85.5
↑=PREV ↓=NEXT 0=MENU
--SELECT ITEM-- 12:00
01 SENS01 06 SENS06
02 SENS02 07 SENS07
03 SENS03 08 SENS08
04 SENS04 09 SENS09
05 SENS05 10 SENS10
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
ALARM OVERRIDE SETPOINTS 12:00
No.: 01
Digital Override Input : 00
Turn Sensor Relay OFF : N
Type : FIX Duration : 00:00
Manual Override : NORM
Leave a Notice in Alarm Log ? NO
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
ALARM OVERRIDE STATUS 12:00
Sensor Name Ovrd St Type Time
1 LIQUID LEVEL 00 Off fIX 00:00
2 REFR LEAK 00 Off fIX 00:00
3 AMBIENT 00 Off fIX 00:00
4 00 Off fIX 00:00
5 00 Off fIX 00:00
↑=PREV ↓=NEXT 0=MENU
SHUT OFF SCHEDULE 12:00
FROM SHUT OFF TIME UNTIL
day time day time
--- 00:00 --- 00:00
--- 00:00 --- 00:00
--- 00:00 --- 00:00
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
SHUT OFF SCHEDULE 12:00
1-N 2-N 3-N 4-N 5-N 6-N 7-N 8-N
9-N 10-N 11-N 12-N 13-N 14-N 15-N 16-N
17-N 18-N 19-N 20-N 21-N 22-N 23-N 24-N
25-N 26-N 27-N 28-N 29-N 30-N 31-N 32-N
33-N 34-N 35-N 36-N 37-N 38-N 39-N 40-N
41-N 42-N 43-N 44-N 45-N 46-N 47-N 48-N
↑=PREV ->=SET-DATA 0=MENU
ANALOG INPUT MODULE 1 STATUS 12:00
Name :AV INPUT 01
Command :NONE
Value :NONE
Alarm :NONE Notice : NONE
Count :NONE
Count Tripped:NONE
↑=PREV ↓=NEXT 0=MENU
ANALOG OUTPUT MODULE 1 STATUS 12:00
Name :AV OUTPUT 01
PID Output :NONE
PID SetPt. :NONE
PWM Output :NONE
Stages: .. ..
↑=PREV ↓=NEXT 0=MENU
DIGITAL OUTPUT MODULE 1 STATUS 12:00
Name :DV OUTPUT 01
Command :NONE
Proof :NONE
Count :NONE
Count Tripped:NONE
↑=PREV ↓=NEXT 0=MENU
ANALOG INPUT MODULE 01 BYPASS 12:00
Name :AV INPUT 01
Enable :NO
Command :Off Type:NORMAL
Time :0005 minutes
Ov State:NORMAL Time Left:----- sec
↑=PREV ->=SET 0=MENU
ANALOG OUTPUT MODULE 01 BYPASS 12:00
Name :AV OUTPUT 01
Enable :NO
Value :000.0 Type:NORMAL
Time :0005 minutes
Ov State:UNKNOWN Time Left:----- sec
↑=PREV ->=SET 0=MENU
DIGITAL OUTPUT MODULE 01 BYPASS 12:00
Name :DV OUTPUT 01
Enable :NO
Command :Off Type:NORMAL
Time :0005 minutes
Ov State:UNKNOWN Time Left:----- sec
↑=PREV ->=SET 0=MENU
STATUS MENU 12:00
1-Main Status 4-I/O Network
2-Input Status 5-Host Network
3-Variable Speed Status
SELECT NUMBER 0=MENU
MAIN STATUS 12:00
1-Group 1
2-Group 2
3-Group 3
4-Group 4
SELECT NUMBER 0=MENU
GRP1 STATUS 12:00
SUCT:(22) 2.0 VS: 01 @ 0 rpm
DSCH:(200)200.9 Ambient: 0
C01 C02 C03 C04 05 06 07 08
*ON
FANS --1--2--3--4--5--6--7--8--9--10--11--12
ON
↑=PREV 0=MENU
GRP2 STATUS 12:00
SUCT:(22) 2.0 VS: 01 @ 0 rpm
DSCH:(200)200.9 Ambient: 0
C01 C02 C03 C04 05 06 07 08
*ON
FANS --1--2--3--4--5--6--7--8--9--10--11--12
ON
↑=PREV 0=MENU
GRP3 STATUS 12:00
SUCT:(22) 2.0 VS: 01 @ 0 rpm
DSCH:(200)200.9 Ambient: 0
C01 C02 C03 C04 05 06 07 08
*ON
FANS --1--2--3--4--5--6--7--8--9--10--11--12
ON
↑=PREV 0=MENU
GRP4 STATUS 12:00
SUCT:(22) 2.0 VS: 01 @ 0 rpm
DSCH:(200)200.9 Ambient: 0
C01 C02 C03 C04 05 06 07 08
*ON
FANS --1--2--3--4--5--6--7--8--9--10--11--12
ON
↑=PREV 0=MENU
INPUT STATUS 12:00
CT BUS PRES 005.1lb SCH PRESS 169.3lb
AMBIENT 73.7df 01 CLEANSW OPEN
01 EXTRA CLOSED 01 TEMP 4 73.8df
01 TEMP 2 73.7df 01 TEMP 3 73.7df
01 TEMP 4 73.7df 01 TEMP 5 73.7df
↑=PREV ↓=NEXT 0=MENU
VARIABLE SPEED STATUS 12:00
GRP1 GRP2 GRP3 GRP4
TYPE : COO COO COO COO
SPEED: 0 0 0 0
RPM : 0 0 0 0
↑=PREV 0=MENU
I/O Bus State : ON
Number Offline : 0
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
8ROs
16AIs
4AOs
CCBs Total 0 , Online 0
Host Net State : ON
Number Offline : 0
RMCC 2 RMCC 3 485A 1


POWER MONITORING 12:00
1-Demand Status
2-Demand Setpoints
3-Hourly Logs
4-Daily Logs
SELECT NUMBER
0=MENU
DEMAND STATUS 12:00
Demand:OFF Timer: 00:00 Setpt: 350KW
Current Power Usage: 0000 KW
Peak Power Today : 0 KW @ 00:00
KWHs Used This Hour: 00000.0
Total KWHs Today : 00000.0
↑=PREV
0=MENU
DEMAND SETPOINTS 12:00
Demand Setpoint : 0350 KW
KW TRANSDUCER
Minimum Voltage : 01.000 V
Maximum Voltage : 05.000 V
Power at Maximum: 05000.0 KW
↑=PREV
0=MENU
HOURLY LOGS # 4 of 1152 12:00
DATE TIME KW HRS PEAK TIME
00/00 00:00 00000 00000 00:00
00/00 00:00 00000 00000 00:00
00/00 00:00 00000 00000 00:00
00/00 00:00 00000 00000 00:00
00/00 00:00 00000 00000 00:00
↑=PREV ↓=NEXT
0=MENU
DAILY LOGS #01 of 48 12:00
DATE KWHRS PEAK TIME DEMAND
00/00 00000 00000 00:00 00:00
00/00 00000 00000 00:00 00:00
00/00 00000 00000 00:00 00:00
00/00 00000 00000 00:00 00:00
00/00 00000 00000 00:00 00:00
↑=PREV ↓=NEXT
0=MENU
CONFIGURATION 12:00
1-Input Definitions
2-Output Definitions
3-System Information
4-Remote Communication
5-Xducer Setup
6-Host Network
7-I/O Brd Setup
8-Sat. Comm.
SELECT NUMBER
0=MENU
INPUT DEFINITIONS 12:00
Input Bd Pt Input Bd Pt
CT SUC PRS 00 00 CT SUC TMP 00 00
DISCH PRESS 00 00 DISCH TEMP 00 00
SPARE 00 00 SPARE 00 00
SPARE 00 00 SPARE 00 00
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
OUTPUT DEFINITIONS 12:00
Output Bd Pt Output Bd Pt
CMPD1 00 00 CMPD2 00 00
CMPD3 00 00 CMPD4 00 00
CMPD5 00 00 CMPD6 00 00
CMPD7 00 00 CMPD8 00 00
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
SYSTEM INFORMATION 12:00
Unit Name: REFRIG MOINTOR & CONTROL
Date: 01/10/96 Time: 05:20 Day: WED
Passwords: #1: 100 #3: 300
#2: 200 #4: 400
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
--SYSTEM OPTIONS-- 12:00
Additional Delay After Defrost:000 m
Notice on Defrost Timeout :N
Power Fail Alarm/Notice :N
Record Logons: NO Powerup Self-Test: Y
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
SYSTEM INFORMATION 12:00
Send Notices to 485 Alarm : N
Disable Alarm Reset by 485 Alm : N
Delay Before Alarm Dial Out : 000 m
DAYLIGHT SAVINGS MODE: AUTOMATIC (USA)
DST MANUAL SET START : 04/01/99
DST MANUAL SET END : 10/27/99
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
SYSTEM UNITS 12:00
Temperature Unit: Deg F
Pressure Unit : PSI
Date Format : Month-Day
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
---DIALOUT SETUP--- 12:00
Change Baud Rate when dial to 9600 =NO
Day Phones: 1.
2.
Night Phones 1.
2.
Use From NONE to NONE , Sat=N, Sun=N
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
--LOGGING SETUP-- 12:00
Select Configuration Type: 0
Use Hourly Log Space : NO
Cont #/Logs #Points * if No Hourly
0 - 192 : 1365 6
1 - 220 : 819 10
2 - 456 : 682 12 Used:0 ↑
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-COMMUNICATIONS SETUP- 12:00
Unit #: 01 Baud Rate 9600 N 8
Initialization String:
AT&F0S0=1&D2X0&W
(For Help Go To the Next Screen)
Send Now: NO Reset at Midnight: N
Response:
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
-MODEM INITIALIZATION STRING- 12:00
Current:
AT&F0S0=1&D2X0&W
Patterns: Number to Copy --> 0
0.Hayes 3. P.P. 2400SA v42bis
1.Multi Tech 4. P.P. 9600SA v42bis
2.P.P. 2400SA 5. Generic
↑=PREV ->=SET-DATA 0=MENU
TRANSDUCER OFFSETS 12:00
Group 1 Suction: 00.0
Group 2 Suction: 00.0
Group 3 Suction: 00.0
Group 4 Suction: 00.0
Discharge Press: 00.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
OIL PRESSURE TRANSDUCER OFFSETS 12:00
01 02 03 04 05 06 07 08
00.0 00.0 00.0 00.0 00.0 00.0 00.0 00.0
09 10 11 12 13 14 15 16
00.0 00.0 00.0 00.0 00.0 00.0 00.0 00.0
17 18 19 20 21 22
00.0 00.0 00.0 00.0 00.0 00.0
↑=PREV ↓=NEXT ->=SET-DATA 0=MENU
TRANSDUCER SETUP 12:00
Disch. Pressure : 500 lb
Suction Pressure:
Grt Grt Grt Grt
1 00 lb 100 lb 100 lb 100 lb
Oil Pressure: 200 lb
↑=PREV ->=SET-DATA 0=MENU
HOST NETWORK MENU - 12:00
1-ONLINE Status 3-Reset
2-Set Device #'s
0=Menu
Host Net State : ON
Number Offline : 0
RMCC 2 RMCC 3 485A 1
HOST BUS DEVICES 12:00
This Controller is Device # 1 :
Alarm If Another Device Fails (N):
Test Host Net for New Devices (N):
HOST NETWORK 12:00
1) OFF 2) Reset (ON)
I/O BOARD MENU - 12:00
1-ONLINE Status 3-Reset
2-Set Device #'s
0=Menu
I/O Bus State : ON 12:00
Number Offline : 0
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
8ROs 1
16AIs 1
4AOs
CCBS Total 0 , Online 0
I/O BOARD DEVICE NUMBERS 12:00
Number 8RO Boards(MAX 16, NOW 0):
Number 16AI Boards(Max 8, NOW 0):
Number 4AO Boards(MAX 1, NOW 0):
I/O BOARD NETWORK 12:00
1) OFF 2) Reset (ON)
-SATELLITE COMMUNICATION- 12:00
Enable Satellite Mode: N
Disconnect Message NO CARRIER
↑=PREV ->=SET-DATA 0=MENU
GRAPHS 12:00
1-Suction Groups
2-Sensors
3-Circuits
4-CCB
5-Comp. Runtimes
6-Fans Runtimes
SELECT NUMBER
0=MENU
--SELECT ITEM-- 12:00
01 DISCHARGE
02 GROUP #1
03 GROUP #2
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 AMBIENT TEMP
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 MSFJ-01
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
--SELECT ITEM-- 12:00
01 CCB #01
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
1 hours 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
1 hours 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
--SELECT ITEM-- 12:00
01 G1 SUC PRS
02 G1 SUC TMP
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
GRAPH CONTROLS
-> <- Scroll
. - Go to current
, - Zoom out, Zoom in
0 - Menu
-- PLEASE WAIT --
Make Selection 0=Main
0 mx=0 mn=0
15/03 11:57 int=0:03:00 15/03 12:00
GRAPH CONTROLS
-> <- Scroll
. - Go to current
, - Zoom out, Zoom in
0 - Menu
-- PLEASE WAIT --
Make Selection 0=Main
0 mx=0 mn=0
15/03 11:57 int=0:03:00 15/03 12:00
--SELECT ITEM-- 12:00
01 MSFJ-01-TMP
02 MSFJ-01-CSW
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
GRAPH CONTROLS
-> <- Scroll
. - Go to current
, - Zoom out, Zoom in
0 - Menu
-- PLEASE WAIT --
Make Selection 0=Main
0 mx=0 mn=0
15/03 11:57 int=0:03:00 15/03 12:00
--SELECT ITEM-- 12:00
01 CCBDischAir
02 CCBRtrnAir
Enter Item:
Arrows to Move (ENT)accept (CLR)Escape
GRAPH CONTROLS
-> <- Scroll
. - Go to current
, - Zoom out, Zoom in
0 - Menu
-- PLEASE WAIT --
Make Selection 0=Main
0 mx=0 mn=0
15/03 11:57 int=0:03:00 15/03 12:00
ALARMS # 1 of 129 12:00
Date Time Description
00/00 00:00
00/00 00:00
00/00 00:00
00/00 00:00
00/00 00:00
↑=PREV Ack Preset Rclear =switch 0menu

Appendix E: Wiring for Case Controller, Power Module, Defrost Module, and Pulse EEV Valve



Appendix F: Wiring for Case Controller, Power Module, Defrost Module, and Sporlan EEPR Valve



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